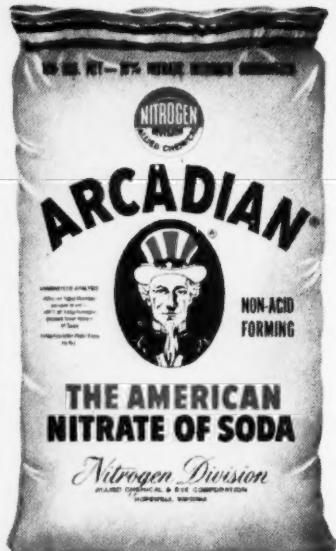


# COMMERCIAL FERTILIZER

CONSOLIDATED  
WITH THE  
FERTILIZER  
GREEN  
BOOK



**Small Grain** crops need nitrogen early, to make vigorous growth and produce abundant yields.

In the late winter or early spring just before growth starts, top-dress each acre with 100 to 300 pounds of **ARCADIAN**<sup>+</sup>, *the American Nitrate of Soda*.

ARCADIAN Nitrate of Soda is the genuine, old reliable Soda many thousands of farmers have used for many years. It contains 16% or more nitrogen, all soluble, quick acting and immediately

**FOR  
Bigger Yields  
TOP-DRESS EARLY!**



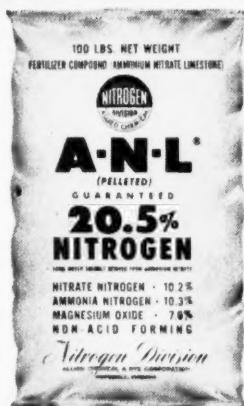
available. Early top-dressing with **ARCADIAN** Nitrate of Soda *makes grain get up and grow!* It doubles and trebles the number of stalks per plant with each extra stalk an added producer of big yields of high-quality grain.

Here is another dependable nitrogen top-dressing material for any crop. **A-N-L**<sup>+</sup> Nitrogen Fertilizer contains 20.5% nitrogen—10.2% in quick-acting nitrate form and 10.3% in long-lasting ammonium form. It also contains 7% magnesium oxide equivalent.



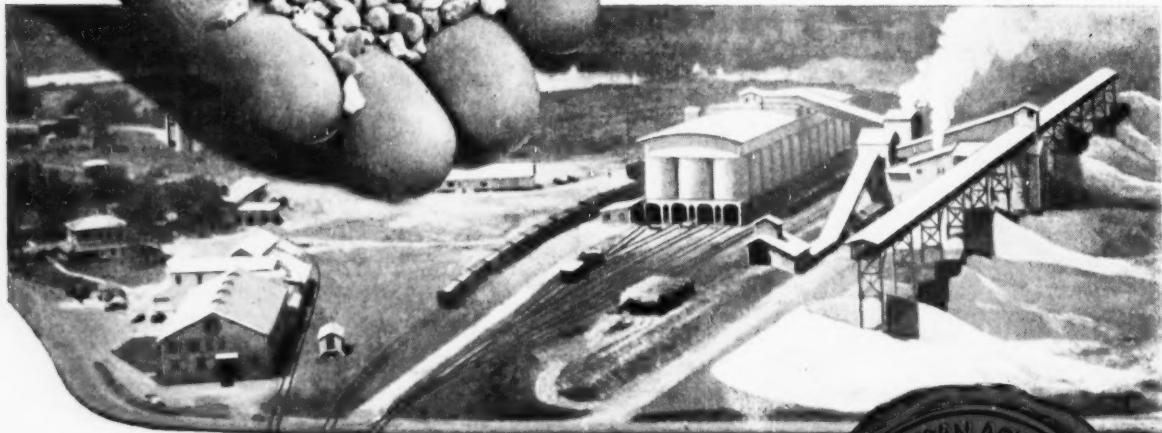
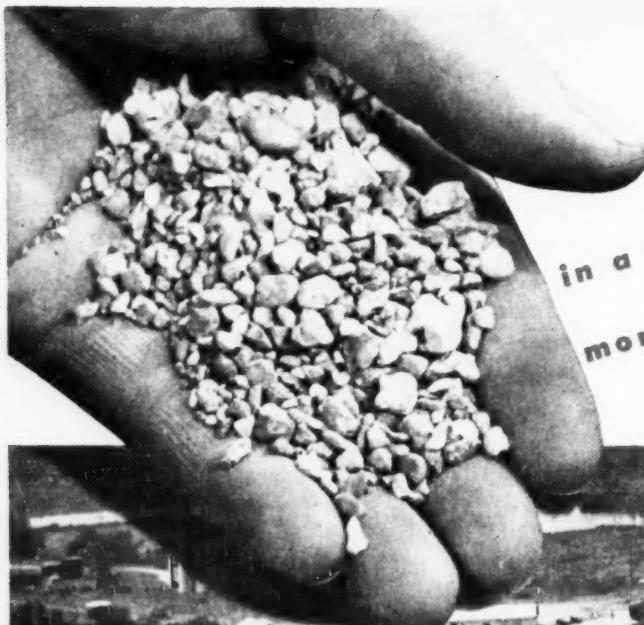
*Nitrogen Division*  
ALLIED CHEMICAL & DYE CORPORATION

New York 6, N. Y. • Richmond 19, Va. • Hopewell, Va. • Columbia 1, S. C.  
Atlanta 3, Ga. • South Point, O. • Omaha, Neb. • San Francisco 3, Cal.



\*Reg. U. S. Pat. Off.

FEBRUARY, 1953



Air view showing dryers and rock storage at Pierce, Florida, headquarters of A.A.C. phosphate mining operations. (Top) Sample of Florida Pebble Phosphate Rock, source of phosphorus widely used in the chemical industries, in its elemental form as well as in phosphoric acid, phosphates and phosphorus compounds. Q This pebble rock is also the principal source of the most important and most generally deficient—plant food element. Often called the Key to Life, phosphorus is essential in maintaining and improving crop yields. Health, growth, life itself, would be impossible without phosphorus . . . so in a way these phosphate pebbles are more precious than gold.



## ***AA Quality...***

for over 85 years a symbol of quality and reliability

### **principal AA QUALITY products**

All grades of Florida Pebble Phosphate Rock      AA QUALITY Ground Phosphate Rock

All grades of Complete Fertilizers      Superphosphate

Gelatin      Bone Products      Salt Cake      Ammonium Carbonate

Sulphuric Acid      Fluosilicates      Insecticides and Fungicides

Phosphoric Acid and Phosphates      Phosphorus and Compounds of Phosphorus

**THE AMERICAN AGRICULTURAL CHEMICAL COMPANY**

GENERAL OFFICE: 50 CHURCH STREET, NEW YORK 7, N.Y.

**One-Stop  
Nitrogen  
Service . . .  
for fertilizer  
manufacturers**



# **LION *Nitrogen*— FERTILIZER MATERIALS**

**LION ANHYDROUS AMMONIA**—For formulation. A uniformly high-quality basic product. Nitrogen content, 82.25%.

**LION AQUA AMMONIA**—For formulation or acid oxidation. Ammonia content about 30%. Other grades to suit you.

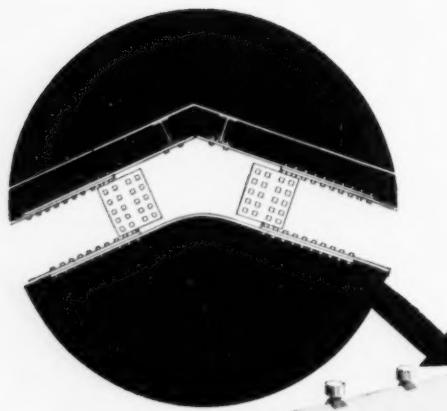
**LION AMMONIUM NITRATE FERTILIZER**—For direct application or formulation. Improved spherical pellets. Guaranteed 33.5% nitrogen.

**LION NITROGEN FERTILIZER SOLUTIONS**—For formulation. Three types to suit varying weather and manufacturing conditions.

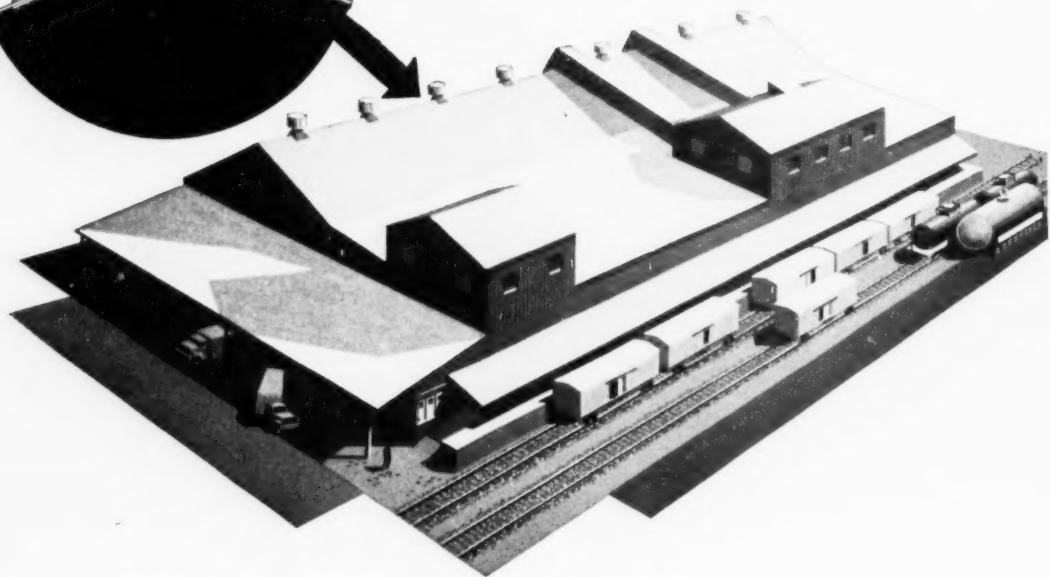
**LION SULPHATE OF AMMONIA**—For direct application or formulation. Large free-flowing crystals. Guaranteed nitrogen content, 21%.

**TECHNICAL SERVICE**—Lion provides special technical assistance for fertilizer manufacturers. Write to **CHEMICAL SALES DIVISION** for quick service.

**LION OIL**  
EL DORADO,  
  
**COMPANY**  
ARKANSAS



## McCloskey Fertilizer Plants are Designed and Built to Resist Corrosion



**Resistance to corrosion** is one of the important factors taken into consideration when McCloskey designs and builds your fertilizer plant. Substantial and compact sections are provided for the frame which is readily protected with acid resistant coatings to insure long life and low maintenance.

**Other design advantages** include greater resistance to damage than wood

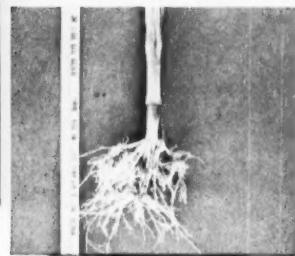
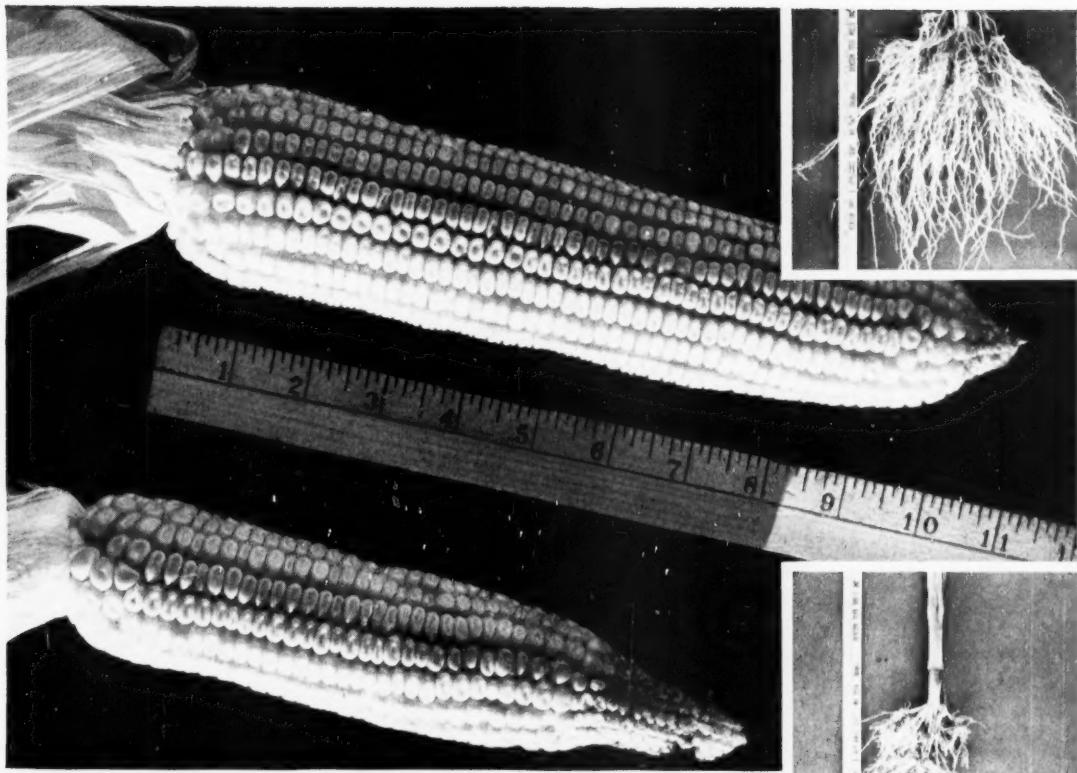
frame or light, space consuming truss construction. The danger of fire loss is eliminated. Clear overhead is provided for conveyor systems, high stacking of material, and the need for eccentric profiles in fertilizer manufacturer are all engineered into your building by McCloskey. Before you plan a new plant ask McCloskey to give you the benefit of their many years of experience in this field. We will save you time and money.

# McCloskey Company of Pittsburgh

**Engineers and Builders**

3412 LIBERTY AVENUE, PITTSBURGH 1, PA.





## 1953 will be a BIG YEAR for aldrin on corn

**Will you be ready to meet the demand?**

MANY GROWERS tried aldrin last season to fight the corn rootworm. Some went "whole hog" and were glad they did. Others treated just a small part of their acreage. We've yet to hear of a single user who isn't satisfied that aldrin is the answer to the corn rootworm problem.

**aldrin-treated corn (top), untreated corn (bottom) from adjacent rows, clearly shows how treatment of the soil with aldrin promotes healthy roots, improves quality, increases yield.**

### HERE'S WHAT ALDRIN DOES FOR CORN:

1. More bushels per acre of higher quality corn.
2. Low-cost-per-acre control.
3. Less lodging . . . easier picking.
4. A healthy early stand . . . no replanting.

Aldrin was extensively advertised as a corn rootworm control last year . . . will get even heavier support this year. So be sure you have enough aldrin. Technical literature is available.

Julius Hyman & Company Division  
**SHELL CHEMICAL CORPORATION**  
 CHEMICAL PARTNER OF INDUSTRY AND AGRICULTURE  
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# COMMERCIAL FERTILIZER

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**weigh  
all the facts  
before you build a**

Extensive research and investigation of all the facts are necessary to make the building of a fertilizer plant economically sound. Where is the plant to be located? What is its proximity to supply? To distribution? How seasonal are demands in the plant area? What basic ingredients will be used more often? What return can be expected on the capital investment? These and many other facts must be considered in order to produce a sound enduring investment.

Many years of experience in the fertilizer industry have made Harte engineers cognizant of the over-all picture of fertilizer plant design.

realizing that certain fundamentals must be followed while specializing the design of each plant. All possible facts are studied and adapted to fit each individual fertilizer plant.

The invaluable experience of Harte engineers is available to aid you in your fertilizer plant design. If you plan to build a fertilizer mixing plant, or an associated plant, the Harte organization of specialists can handle your complete job or any part from original design to an operating plant . . . assuring economy and speed.

Harte Engineers will be glad to discuss your plans with you, without obligation. Write today.

**ENGINEERS**

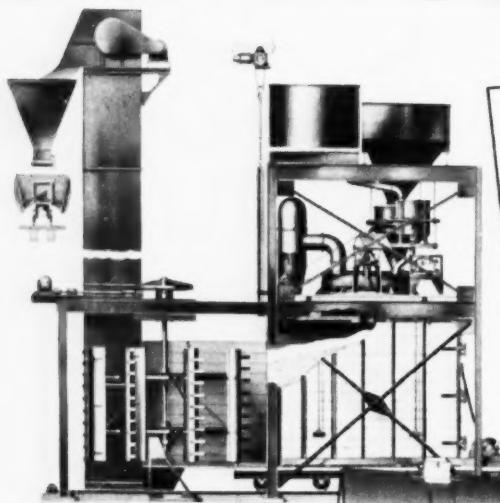
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**John J. Harte Co.**

**284 Techwood Drive, N.W., ATLANTA • NEW YORK • HOUSTON • MEXICO, D.F.**

# Sturtevant Fertilizer Equipment

**Increases Production...  
Cuts Costs of Fertilizer  
Manufacture**



**Sturtevant  
Den & Excavator**  
Produces Quality  
Superphosphate  
Economically

## Announcing the New Continuous Superphosphate Manufacturing Process

For over 50 years, the Sturtevant Mill Company has been a leader in the design and manufacture of fertilizer equipment. Equipment that has cut costs, increased tonnage throughout the industry.

Because of the demand for a continuous process for making superphosphate, Sturtevant proudly announces its Continuous Den to make the same high grade material as has been produced for years in the Batch Den and Excavator. If you are planning to install a continuous superphosphate system, investigate this equipment, today.

Either the Continuous Den or the Batch Den produces super in excellent physical condition with low insoluble and moisture content.

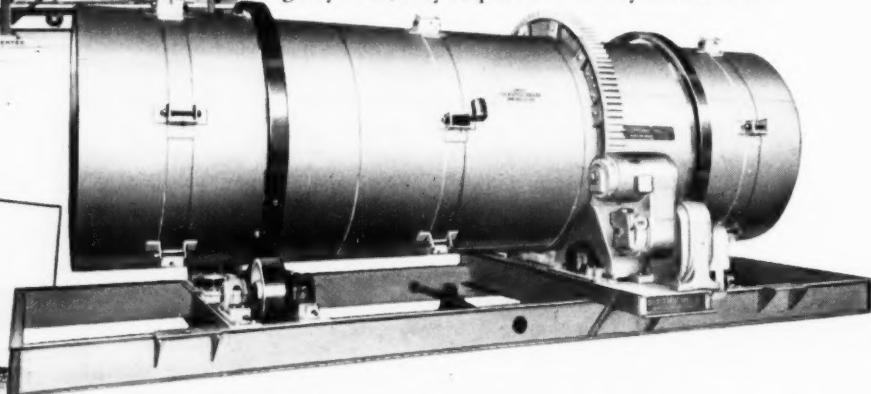
The Sturtevant Den and Excavator Units provide a complete method of producing superior, bulky superphosphate either single, enriched

or triple . . . quickly and economically. The Batch Den is easily operated by two men to produce 16 to 40 tons per batch and up to 480 tons per day while the Continuous Dens are designed for 12 or more tons per hour. Ruggedly built, they require little if any maintenance.

**Sturtevant  
Granulation  
Process**

Sturtevant fertilizer granulating units provide you with a complete process for manufacturing granular fertilizer. These efficient units can be supplied for various hourly tonnages and certain granule sizes depending on your particular requirements.

Write for complete information about Sturtevant Mill Fertilizer Equipment.



**Sturtevant Mill  
COMPANY**

111 CLAYTON STREET • BOSTON 22, MASSACHUSETTS

---

# ACCELERATED FERTILIZER CONDITIONING

With TENNESSEE'S

## SUL-FON-ATE AA9!

Our own fertilizer plants have been experimenting with wetting agents to reduce curing time and prevent secondary caking of mixed fertilizers. **SUL-FON-ATE AA 9** has been found to be very effective in this application and it is now being regularly used by our plants.

Tennessee's **SUL-FON-ATE AA 9** is an alkyl aryl sulfonate containing 90% active ingredient. It is a powerful wetting and penetrating agent that promotes better contact between the fertilizer components. This intimate contact reduces the time required for completion of the reaction.



UNTREATED



TREATED

These pictures show the effect of the addition of Tennessee's **SUL-FON-ATE AA 9** to one of our more troublesome formulas. The nitrogen was all solution. Both samples were cured for 4 days and then bagged. The bags were stacked for 10 days and the above samples were taken from the bottom bags.

These and other tests have shown that 4 day's curing is sufficient and that stored bagged goods are much more resistant to caking when Tennessee's **SUL-FON-ATE AA 9** is used.

### METHOD OF APPLICATION

Since manufacturing processes vary widely in fertilizer plants, the best method of introduction into the mixer must be determined at each plant. Our plants prefer to distribute it on the conveyor belt feeding into the mixer. In the pictures shown **SUL-FON-ATE AA 9** was added to the potash. It is not necessary to make any changes in operating procedure.

For further Information, please contact  
ORGANIC CHEMICALS DIVISION

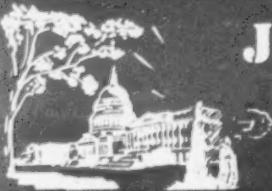
TENNESSEE

617-29 Grant Building,



CORPORATION

Atlanta, Georgia



# JUST AROUND THE CORNER



By Vernon Mount

STALEMATE IN EUROPE is really worse than the one in Korea. We can't pull out, and we can't make progress. And we need to make genuine progress because that is our West Wall against Communist aggression. Perhaps the Dulles visit will help.

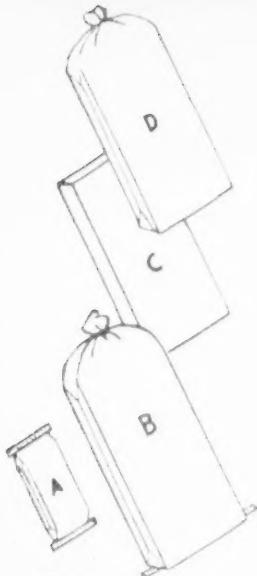
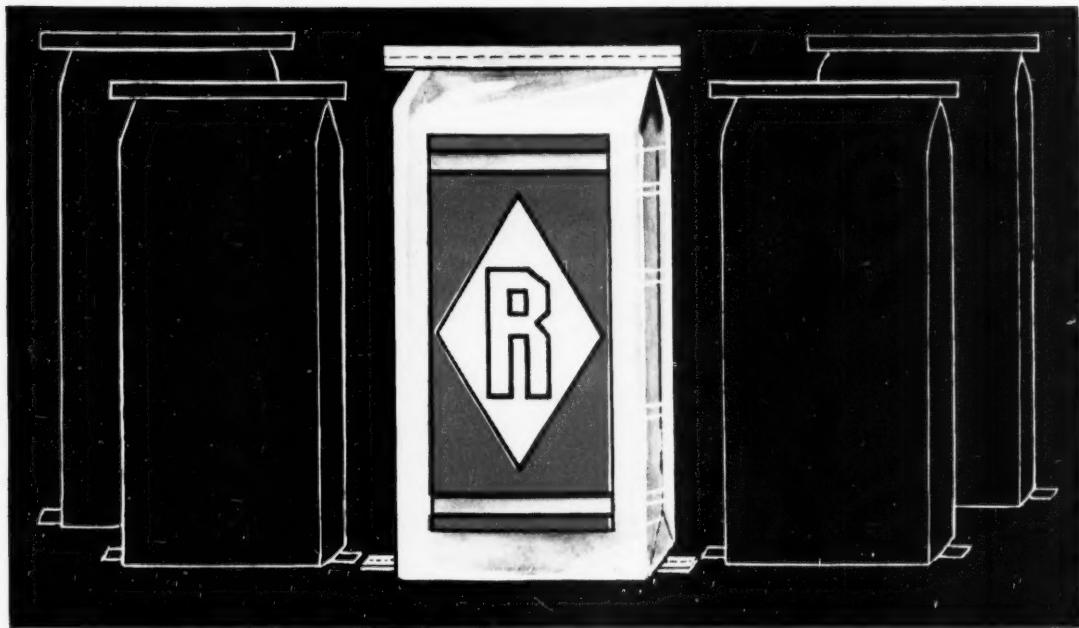
DO-NOTHING FRENCH block us. A few top men who always stay on top, no matter how often the Government changes, no matter how the news from Paris sounds. They drag their feet over anything that looks like a strong Atlantic Alliance, especially with a German army in the picture.

GERMANS, JAPS, DO BUSINESS meanwhile. Both of them are giving the British fits in the East, putting on a show of aggressive and intelligent salesmanship that any American would be proud of--financing, quick deliveries, service before and after the sale. We can look with admiration, but we have a 35 billion dollar stake in Britain now--and the less trade they have, the more they become our problem.

WORLD LEADERSHIP is a real responsibility these days!

Yours faithfully,





**A RAYMOND MULTI-WALL PAPER SHIPPING SACK has eye-appeal, that better quality look that keeps a product up front, ahead of competition.**

Many times you have heard the expression "There's no substitute for quality," and this is especially true in the packing and shipping container field. Raymond Multi-Wall Paper Shipping Sacks are made from a better quality, specially prepared Kraft paper, sewn or pasted with better quality materials, and printed with better quality, fade-proof inks that sparkle with lasting brilliance. You give your products all these advantages when you pack and ship them in Raymond Multi-Wall Paper Shipping Sacks.

**A** Illustrates a Raymond valve, sewn end, Multi-Wall Paper Shipping Sack.

**B** Illustrates a Raymond open mouth, sewn end, Multi-Wall Paper Shipping Sack.

**C** Illustrates a Raymond valve, pasted end, Multi-Wall Paper Shipping Sack.

**D** Illustrates a Raymond open mouth, pasted end, Multi-Wall Paper Shipping Sack.

Raymond Multi-Wall Paper Shipping Sacks are available in various sizes and strengths—printed in multi-colors or plain.

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**RAYMOND** Multi-Wall  
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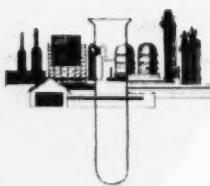
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for the packaging, shipping

and storage of Fertilizers



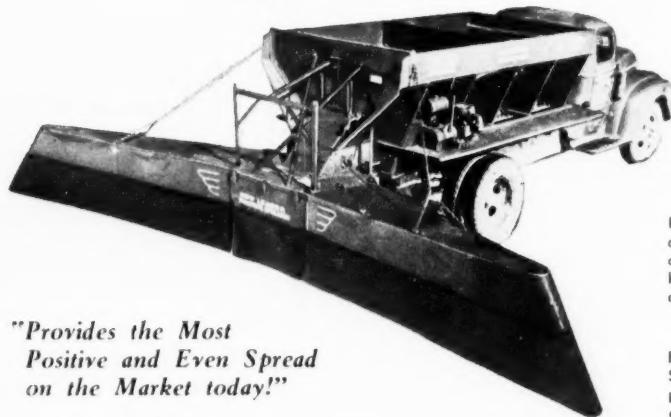
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CHICAGO 6, ILLINOIS

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2. The first successful lime spreader with a chain conveyor.
3. The first lime spreader built with Twin Distributor Discs.
4. The first lime spreader with successful center dump.
5. The first lime spreader with a back endgate swinging wide open.
6. The first lime spreader with running boards or catwalks as standard equipment.
7. The first lime spreader with a 24" wide conveyor trough.
8. The first spreader with an all-steel frame and wooden hopper.
9. The first lime spreader with a successful attachment for spreading bulk or sacked commercial fertilizer.
10. And now! The first commercial fertilizer spreader with distributor discs driven at a constant speed by a separate motor. Conveyor chain positively synchronized with speed of rear truck wheels, assuring full width spread at all times and uniform distribution.

by recommending  
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**SPREADER**  
for Custom Spreading

Right in your territory, there are men who can be induced to go into the business of custom spreading. Many dealers of commercial fertilizer and limestone are getting bigger sales volume through the aggressive promotion of the custom spreading idea.

URGE YOUR SALESMEN TO BE ON THE LOOKOUT FOR CUSTOM SPREADING PROSPECTS!

Every time you induce a man to buy a "New Leader" Spreader, you make a friend and a customer. He will promote the sale of commercial fertilizer and limestone and you will make a profit on the fertilizer which he buys from you.

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**LIMESTONE SPREADER**  
**SELF-UNLOADING**  
**BULK TRANSPORT**  
**TAILGATE SAND AND CINDER SPREADER**  
**HI-WAY MATERIAL SPREADER**  
**BULKMASTER, JR.**  
**COMB. COMMERCIAL FERTILIZER AND LIMESTONE SPREADER**  
**FEEDMASTER**  
**TRUCK MOUNTED SAND AND CINDER SPREADER**



"New Leader" Spreaders spread a minimum of 100 pounds per acre, to any maximum desired up to 4½ tons per acre. Send coupon for free literature and name of your local distributor.

## "NEW LEADER" SELF-UNLOADING BULK TRANSPORT

Penninsular Spreading Service of Kissimmee, Florida purchased three 33-ft. New Leader Self-Unloading Bulk Transports and two New Leader Fertilizer Spreaders for spreading fertilizer on pastures and in citrus groves.

This 20-ton transport with elevator in place is ready to load a "New Leader" Spreader Truck. Eliminates demurrage on freight cars; gets fertilizer to the job quickly. Spreader trucks can stay in field as this is a complete

self-unloading unit, leaving tractor free to return for another transport load. Unit divided into four 5-ton compartments. Each may be unloaded independently. Compartments and endgate removable for hauling bagged and packaged goods. Capacity 5 to 25 tons, 11 to 40 feet long.

## HIGHWAY EQUIPMENT COMPANY, INC.

Manufacturers of the World's most complete line of Spreaders and Bulk Delivery Equipment

635 D Ave., N. W.

Cedar Rapids, Iowa

February, 1953

Send full information on:  
Spreader      Bulk Transport  
Bulkmaster      Complete line  
Name  
Address  
City      State

# Sulphur

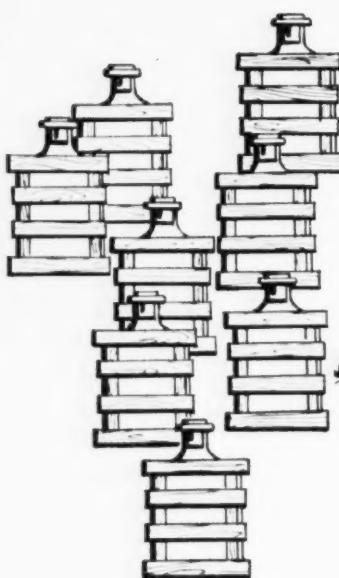
*Thousands of tons*

*mined daily,*

*but where does it all go?*



*Loading a ship with Sulphur at Galveston*



**P**ARAPHRASING an old saying: 'It takes a chemical to make a chemical,' certainly applies to hydrochloric acid.

No chemical engineer has to be told how hydrochloric acid is made but sometimes with the mind focussed on the word "hydrochloric" little thought is given to another word "sulphuric." It is this word that calls attention to the fact that to make one net ton of 20° Bé hydrochloric acid by the  $H_2SO_4$  process requires about 950 pounds of this acid, basis 100%, which is equivalent to 320 pounds of Sulphur. About one third of the annual hydrochloric acid production is made by the use of sulphuric. The sulphur is not lost because salt cake, a by-product, also has commercial value. But any way you figure it, the hydrochloric acid industry is an important consumer of Sulphur in the form of sulphuric acid. In fact, it takes several days' production from all the Sulphur mines to take care of the annual production of this one commodity alone.

When one considers all the other chemicals that require sulphuric acid or other Sulphur compounds for their manufacture, it is not difficult to appreciate how faithfully the Sulphur Industry is serving industry today in spite of the great demands made upon it.

**Texas Gulf Sulphur Co.**

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas





## Her fingertips imagine the taste

The lady doesn't trust her eyes alone.

The buyer of Multiwalls is in much the same position.

Aside from package design, it's hard to tell one manufacturer's bag from another's simply by looking at it or fingering it.

Put the bags out of sight and you may be able to see many differences.

Men who buy 85 per cent of all Multiwalls consider\* these intangibles more important than any other factor when they choose their supplier.

Invariably, these are among the first questions they ask . . .

"Is this company big enough?"

"Do they have a fair allocation policy?"

"Are their prices competitive?"

"Do they respect delivery dates?"

In a nutshell—

"Are they good people to do business with?"

We can't tell you what the answers are when these Multiwall users consider Union. This we do know . . . and the inference is yours to make—

In these days of industrial pressure, when *dependability* is a fervent wish as well as a word, men to whom Multiwalls are important are placing an increasing share of their orders with Union.

More so every day . . .

**IT'S UNION FOR MULTIWALLS**



\*August, 1951 research study.

UNION BAG & PAPER CORPORATION • NEW YORK: WOOLWORTH BUILDING • CHICAGO: DAILY NEWS BUILDING

# POTASH & NITROGEN

Muriate & Sulphate      Sulphate of Ammonia

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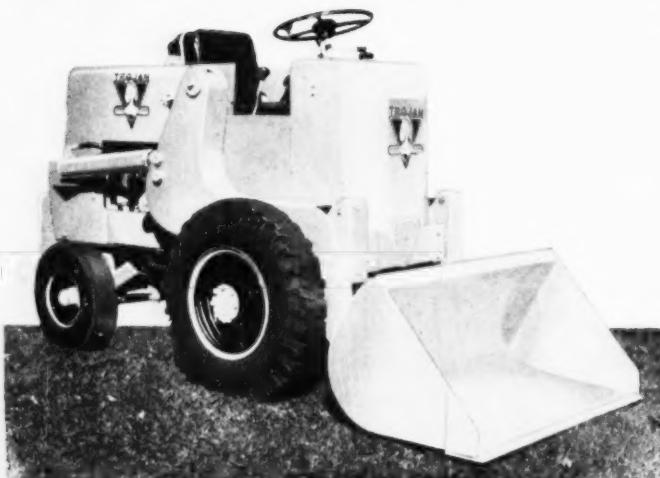
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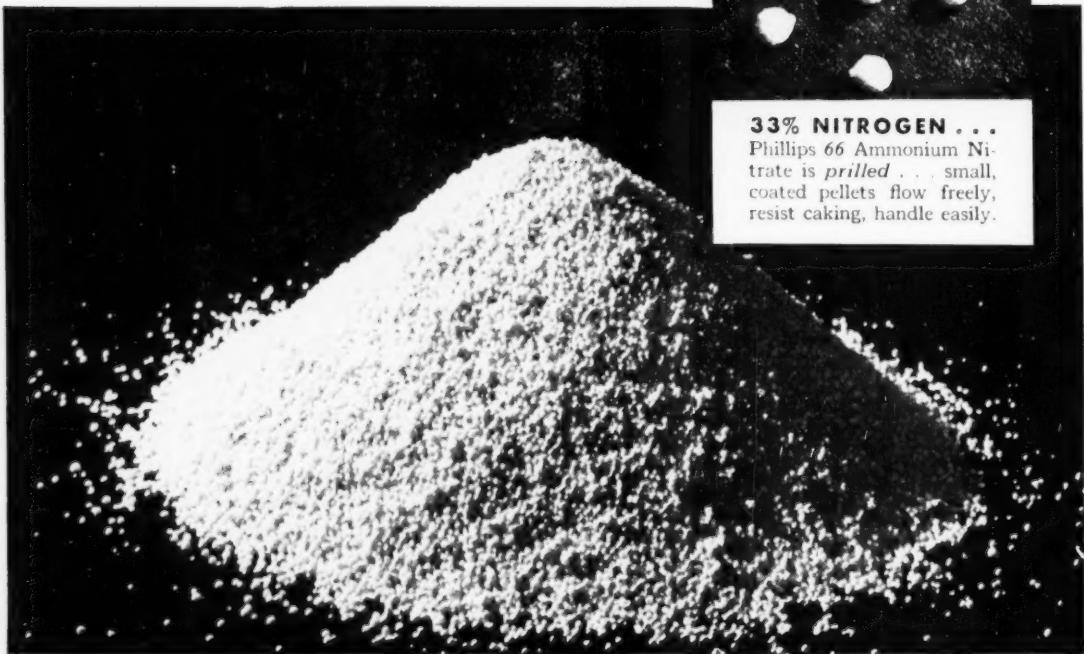
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# Random NOTES & QUOTES

This is really a hangover from Christmas, but we just heard about it and can't resist: The Pullman Company reported a passenger who boarded a sleeper at Seattle, seemingly lost his Christmas spirit enroute East, because when he got off he left behind a Christmas tree seven feet tall!

Speaking of trees, Tennessee is cooking up a law requiring phosphate mining companies to refill cuts when mining is completed, and plant trees. Monsanto and Victor are both affected by these, with their operations on forest land in that State.

Here's a thought for folks hit by the reforestation plan above: In Oklahoma some agriculturists took 57 acres bought from a coal mining operation—torn, unsightly land—and planted Christmas trees. These are now being harvested annually, and make a neat little crop return for the smart boys who thought up the idea.

Down in Florida, Florida Machine and Foundry, working with Caterpillar Tractor have cooked up a root-cutting machine that makes it easy to clear land.

And Barrett-Cravens of Chicago have developed portable cranes that will handle from 500 to 5000 pounds, which can reach over barriers to pick up their loads.

Out in Bismarck, N. D. the farmers were told by R. B. Widdifield, extension agronomist, that if they would use fertilizer on their fields it would give them as much added income as 22 times the number of oil wells now producing in the State.

Up in Canada, there's a one-man limestone operation. Norman Bonner blasts the chunks out of a hill runs the crusher himself.

(Continued on page 48)

## *It Seems to Me*

by BRUCE MORAN



There are a lot of things might be discussed in this edition of *It Seems to Me*. The farmers are holding back and the warehouses are beginning to burst at the seams. Vernon Mount could tell you why a lot of that has happened. He is constantly carping about the frantic contradictions of the economists. And they have so thoroughly sold the farmer on the idea 1953 will be an off year for agriculture that they are setting out to prove it by not fertilizing their land.

Or we could talk about the reorganization of the USDA, which Secretary Benson has regrouped from 20 agencies and bureaus to 4 divisions, plus the Solicitor's office, after calling it "swollen into a huge bureaucracy". We hope and trust the functions which have been of such real service to agriculture will not go by the board in the effort to weed out whatever feather-bedding there may be.

We can hope this more securely after reading this quote from an interview Clarence Poe, Progressive Farmer Editor, had with President Eisenhower before he had even announced for the office: ". . . it must be a great satisfaction to maintain the fertility of a farm and pass it on unharmed to the next generation. The work I did on a farm was of great benefit to me. In fact, I frequently wish I had been a farmer."

It seems to me a good thing to have in the White House a man with a viewpoint like that.

### INDUSTRY CALENDAR

Date	Organization	Hotel	City	State
Feb. 9-11	So. Ag. Workers	Jung	New Orleans	La.
Mar. 1-3	Sou. Safety Sec.	Biltmore	Atlanta	Ga.
Mar. 11-13	NAC	Jung	New Orleans	La.
June 11-14	APFC	Homestead	Hot Springs	Va.
June 15-17	NFA	Greenbrier	White Sulphur, W. Va.	
July	Canadian	Algonquin	St. Andrews	N. B.

## The STATE-LEVEL

# Educational MOVEMENT



**Hugh A. Woodle**

Hugh A. Woodle, Extension Agronomy Leader, Clemson College, South Carolina, convinced that industry serving agriculture within the State would welcome an opportunity to pool the efforts and influence of its personnel towards promoting sound agricultural programs, approached members of the fertilizer and materials industry and sold them his idea. A committee from the industry worked with Mr. Woodle and Mr. B. D. Cloaninger, representing Clemson's Extension Service and Experiment Station respectively, and the result was the formation of The South Carolina Plant Food Educational Society June 6, 1950, the first of its kind in the United States. Mr. A. D. Kincaid, Manager, Fertilizer Department, Southern Cotton Oil Company, Columbia District, was made the first president of the Society, and with his guidance for two years, the organization became deep-rooted and active.

Now in its fourth year, our Society, with much help from its Advisory Committee, consisting of heads of the various agricultural agencies, is cooperating effectively with Clemson College and other

agencies in promoting sound agricultural programs with resultant higher profits for farmers, and increased and more efficient use of fertilizers.

In conjunction with the current National Program for More Efficient Use of Fertilizer and Lime, Director D. W. Watkins of Clemson's Extension Service appointed the Board of Directors of our Society as Industry Advisory Committee to the State Agronomy Committee. The joint efforts of these committees should prove helpful in keeping recommended grades at a minimum, and

at the same time conform to sound agronomic practices.

The effectiveness of our Society's functions in the past and its role in the future are well expressed in the following statement made by Mr. Woodle January 17, 1953: "The South Carolina Plant Food Educational Society has succeeded in bringing about a much desired spirit of close cooperation between the fertilizer industry and Clemson College in helping farmers toward better farm living. The Society is playing an important part in South Carolina's contribution to the National Fertilizer and Lime Program."

Those interested in forming a state-level society can secure from South Carolina a booklet on how the #1 organization operates. Write J. N. Davis, Sec.-Treas. S. C. Plant Food Educational Society, P. O. Box 98, Leesville, S. C.

## "COMMERCIAL FERTILIZER" HELPED GIVE IMPETUS TO THE IDEA

In November, 1951 the staff of Commercial Fertilizer saw, clear-cut, an answer to our frequently published plea for closer coordination between the farm, the college, the fertilizer industry and its suppliers. We had for years written of this need. So when the South Carolina Society came along and was followed by the Georgia group, we called it "the most valuable news that has come here for a long time." And later we said: "Our industry is pushing its equipment to capacity and beyond to satisfy a demand engendered by

war-time and high prices for commodities.

"But those two factors will not always be with us, and an industry making twice the goods it did ten years ago will have a rude awakening unless steps are taken now. The state-level Plant Food Educational Society is the answer. As Billy Barton said . . . these forces need to be 'connected up' .

So we have reported every scrap of news we could find about such societies, and are proud that they are beginning to burgeon around the map . . . as this issue proves.



## SOUTH CAROLINA GROUP STRESSES LIME-FERTILIZERS-CREDIT AT MEET

Efficient use of lime, fertilizers, and farm credit were emphasized by speakers who appeared on the program at the state-wide fertilizer meeting held in Columbia January 15. The meeting was called by Dr. R. F. Poole, president, Clemson College. B. D. Cloaninger, head, Clemson Department of Fertilizer Inspection and Analysis, presided. About 400 representatives of the fertilizer industry, agricultural workers, and others attended.

Both D. W. Watkins, director, Clemson Extension Service, and Dr. H. P. Cooper, director, South Carolina Experiment Station, stressed the importance of the use of lime along with fertilizers for increased crop yields. Both stressed the importance of grass and livestock in the balanced program of farming now being developed in the state and urged efficient use of lime and fertilizer to produce the grass and other feed crops needed for livestock production.

Dr. H. G. Allbritten, associate agronomist, South Carolina Experiment Station, pointed out the advantages of soil testing in determining soil acidity and deficiency of

one or more plant food elements. He reported that progress is being made in completing a soil-testing laboratory at Clemson, which will be second to none in the South.

Hugh A. Woodle, leader, Clemson Agronomy Extension Work, pointed out that a more efficient use of lime and fertilizer must be made if the fewer people now on farms are to provide more food and fiber to meet the needs of an increasing population.

Bachman Smith, Charleston, and A. D. Kincaid, Columbia, called attention to the need for close cooperation among fertilizer manufacturers, dealers, and farmers in order to extend the handling season of fertilizers over a longer period.

Other speakers on the program and points presented by each included the following: Albert Fuchs, Charleston, who suggested close cooperation between those who recommend the use of insecticides and those who handle insecticide materials in order to avoid shortages, and J. N. Davis, Leesville, who reported shortages in certain types of planting seed and advised buyers to get the best seed available.

### SCPFES Board

Officers & Board of Directors of South Carolina Plant Food Educational Society. Front row: J. N. Davis, Sec-Treas, Epting Distributing Co.; H. B. Davis, President, Spencer Chemical Co.; A. B. Kincaid, Sou. Cotton Oil Co.; P. T. Ziegler, Armour Fertz, Wks. Back row: A. J. Sittion, Pendleton Oil Mills; D. M. Avinger, Holly Hill Fertz. Co.; F. W. Atkinson, IM&C; S. F. Stoudenmire, Farmers Fertz. Co.; B. S. Smith, Naco Fertz. Co.

ABSENT as picture was made: Louis Smith, F. S. Royster Guano Co. V-P; E. D. Sallinger, Sou. Fertz. & Chem. Co.; J. Hamilton Logan, Jr., Logan-Robinson Fertz. Co.

Henry Johnson, Farm Credit Administration; R. H. McElveen, Farmers Home Administration; and E. R. Alexander, executive manager, South Carolina Bankers Association, reported that credit for farmers in 1953 is limited only by sound credit requirements, but they urged that farmers be advised to use credit wisely.

Dr. D. M. Farrar, entomologist, South Carolina Experiment Station, (Continued on page 69)

### S.C. Fertilizer Meet

Left to right: 1st row: Dr. R. F. Poole, President, Clemson Agricultural College; A. D. Kincaid, Southern Cotton Oil Company; D. W. Watkins, Director, South Carolina Extension Service; H. A. Woodle, Leader, Extension Agronomy Works; Dr. H. P. Cooper, Director, South Carolina Experiment Station; Dr. M. D. Farrar, State Entomologist.

Left to right: 2nd row: Albert Fuchs, Naco Fertilizer Company; J. N. Davis, Epting Distributing Company; J. E. Youngblood, Chairman State Commission on Marketing; B. D. Cloaninger, Head, Department of Fertilizer Inspection and Analysis; Dr. H. G. Allbritten, Associate Agronomist; Bachman Smith, Charleston, S. C.



# Jack Rutland AT GPFES MEETING, SAYS:

## "LET'S HAVE 100% SALESMANSHIP"

By JACK RUTLAND  
International Minerals & Chemicals

I would like to make it clear at the beginning that I am speaking entirely as an individual and expressing only my personal opinions. Nothing I may say is intended to define the ideas or policies of the concern which I represent, nor to refer to any person or concern.

Measured in time, the fertilizer business is an infant industry just emerging from the crib. To you, who are in the old belt and familiar with it, it is not necessary to trace the history of growth and development from the Indians' fish, to the early settlers cow manure, to the mixtures of packers' refuse and waste organic materials, to the highly concentrated chemical compounds of today. Nor need we cite the evolution from a sort of business scavengers into the fine institutions of today which are recognized and respected as essential to our national economy.

Along with this there has occurred even greater development in the science of agronomy, in the field of plant nutrition and its effect upon animal and human welfare, and the economic evaluation of balanced nutrient rations properly applied.

I am confident that we stand today upon the threshold of tremendous development, limited only by how well we exercise the ability to progress, both in the scientific and production fields represented here, working together as a co-ordinated battery, pitching to the farmer a means of more profitable and stable

Here is a program that gets more business, without taking it away from a competitor, without any additional salesmen, by intelligent use of the skill and experience of the men we have. In this talk, Jack Rutland joins his voice to the swelling chorus of those who are asking, insistently: "If we have such a wonderful story to tell, why aren't we out there telling it to the farmers?" A good question it is, too.

crop production, which in turn promotes economic security for all three of us, as well as the country as a whole.

Now, that may strike you as a lot of high-sounding idealistic hokum. Perhaps it is. But I submit the idea that without an ideal there is little progress, and what we do becomes merely the drudgery of day labor. Nor do I in any degree belittle the very definite incentive of personal profit. That is, of course, so long as we protect and nurture our system of private enterprise and individual initiative, under which these ideals can reach maximum fruition, and which is perhaps more definitely true in the best interest of the farmer himself.

During the past 25 years, the development in Plant Food production methods and techniques has been little short of remarkable. Under the demand of necessity, during the war years, tonnages were doubled and then tripled without any comparable increase in basic plant capacities. New sources of supply, liquid solutions, and high analysis compounds replaced the old dry-mix materials, and posed very different problems of production, in physical condition, and chemical control. Pulling together to reach emergency goals, research men, chemists and engineers accomplish-

ed the impossible, through the development of improved processes, more efficient machines and equipment for blending and handling, and a far greater knowledge of formulation and chemical reactions. Mother necessity really spawned a brood of invention, to which the industry can point with pride.

In the same period there has been a parallel advance made in the knowledge and application of plant feeding, cultivation and conservation by agronomists, state colleges and vocational schools, which today function through an army of some 100,000 trained workers in experiment stations, county agents, and extension services.

Both of these results have been geared to what is the nucleus of the whole thing—an increased food and feed production to meet the requirement and raise the living standard of a rapidly growing population.

I am going to venture the prediction that the next five to ten years will see even greater developments in the area of production technology, which will pyramid upon the base of what has recently been learned. I would not be so foolish as to say what they will ultimately be, but the trend indicated is toward such processes as nitrrophosphates, higher utilization of solutions, homo-  
(Continued on page 62)

Talk before Georgia Plant Food Educational Society, Athens, Georgia—January 20, 1953.

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# Georgia PLANT FOOD EDUCATIONAL SOCIETY

The annual meeting of the Georgia Plant Food Educational Society had only one drawback. George Scarseth talked so much about Georgia's need for rain that the elements outdid themselves to prove him wrong—and some of those who went home that night found themselves forced by the downpour to hole up in motor courts or try to wait out the storm under other shelters. We hope George made that plane to Toronto!

About a hundred men—argonomists, university staff, fertilizer manufacturers and suppliers—gathered to attend the session, which was timed to precede the meeting of the Georgia Section, ASA, and was well attended despite the fact that it bucked the inauguration of President Ike. It was because of this conflict that Dr. Karl D. Butler, scheduled to speak, could not be there, and his place was capably filled by Dr. H. B. James, head of the department of agricultural economics at North Carolina State. And because of this, too, D. W. Brooks—who is actively aiding the new administration in the development of its agricultural program—was not there to present Dr. Butler.

But enough of what did not happen—here's what did:

With President Malcolm Rowe presiding, Jack Rutland, general manager of IM&C's plant food division made the major talk of the afternoon. As we are running most of this talk in this issue we will say here only that it outlined as sound a plan to sell fertilizer as we have ever heard—and every fertilizer man in the industry, large or small, will do well to read it.

There was then a business meeting, in which Cooper Morecock made reports as secretary and as treasurer. He reported the affairs of the Society in excellent shape. Of special note was the project—a Georgia

grazing contest. For this, \$2500 will be needed for prizes and for a banquet when the prizes are handed out—and Finance Chairman W. L. Baughcum reported they had raised \$2710 after one simple request to the membership. 43 concerns had responded promptly, and oversubscribed the budget. The balance "will be put to good use" said the treasurer.

A new chart, showing fertilizer recommendations within the framework of the new short list recommended by the Society and adopted by the State, was shown—and the State will distribute these to the extension people and members of the industry. Those desiring extra copies in quantity can do so.

A request came from the floor that the State supply the industry with a breakdown by counties of tonnage in each of the new analyses, and this was agreed to by State representatives present. The reports will be made semi-annually: January to June; July to December. But the industry is on notice that prompt reporting is essential if these reports are to be made up and distributed on schedule.

Walter Brown, associate director Georgia AES, discussed the national fertilizer and lime usage program, which has been reported here in full. He summed up conditions like this: farm population is steadily falling; general population is rapidly rising; and production per farmed acre is rising.

Dr. James, pinch-hitting for Dr. Butler, presented a thoughtful analysis of the short and long-haul prospects for economic conditions, which seem to be pretty good, unless peace really comes to the world. Specifically on the subject of Agriculture, Dr. James stressed the fact that the farm is in a squeeze be-

tween prices and costs, meaning that every trick of mechanization, every bit of the new technology of farming, must be put to work for the farmer to make a profit. We must give solid, scientific study to knowing when the final pound of fertilizer ceases to be profitable, so we will use enough, but no more than enough to do the job.

On the long haul side, the most important study is employment, because it is an index of conditions in itself, and because people on pay-

(Continued on page 68)

## Key To Pictures

1. Officers and directors available for picture: Front row: W. L. Baughcum, International Minerals & Chemical Corp., East Point; Malcolm A. Rowe, Rowe Warehouse & Fertilizer Co., Athens; W. A. Higginbotham, Jr., Armour Fertilizer Works, Albany; 2nd row: J. B. Williams, Commerce Fertilizer Co., Commerce; Cooper Morecock, Jr., Nitrogen Division, Allied Chemical & Dye Corp., Atlanta; J. E. Nunally, Cotton Producers Assoc., Atlanta; 3rd row: J. M. Shepherd, J. I. Davis, Southeastern Liquid Fertilizer Co., Albany; W. W. Harley, Southern Fertilizer & Chem. Co., Savannah. Not available when picture was taken: H. M. Arnold, H. M. Arnold Fertilizer Co., Monroe; Charles Belding, Empire State Chemical Co., Athens; John Sanders, Spencer Chemical Co., Atlanta; Frank S. Pope, dealer, Villa Rica; Warren Lott, Blackshear Mfg. Co., Blackshear; E. L. Anderson, dealer, Statesboro; J. H. Wyatt, dealer, Brooklet; Larry D. Hand, Pelham Phos. & Fert. Co., Pelham; T. N. Wiggins, Fidelity Products Co., Edison. 2. Malcolm Rowe, president—also president Athens Chamber of Commerce—just elected. 3. Jack Rutland, International Minerals & Chemical Corp., Chicago. 4. Cooper Morecock. 5. Walter Brown, Georgia Agricultural Experiment Station. 6. Dr. H. B. James, North Carolina State College, Raleigh. 7. Dr. George Scarseth, American Farm Research Assn. 8. Dr. Fielding Reed, American Potash Institute, Chairman Ga. Section ASA. 9. Dr. C. C. Murray, University of Georgia, presenting honorary Ga. PFES memberships. 10. Widow of Dr. W. O. Collins head of agronomy dept., University of Ga., accepts honorary membership in Ga. PFES for her late husband. 11. Dr. E. D. Alexander, University of Georgia, accepting honorary membership. 12. New president of Georgia PFES, J. M. Shepherd. 13. Robert H. Engle, National Fertilizer Assoc., presenting award to J. P. Baker, County Agent. 14. Student Fred Kellogg, thanks Georgia Section Amer. Soc. Agronomy for sending him to meeting. 15. J. N. Davis, Epting Distributing Co., Leesville; and H. B. Davis, Spencer Chemical Co., Columbia, secretary and president South Carolina PFES.

**ANNUAL MEETING  
STORY AND CF  
STAFF PICTURES**





## STATE-LEVEL GROUPS RAPIDLY FORMING AS THE IDEA SPREADS

Recognition of the soundness, of the need for closer coordination, of the need for fertilizer sales, the Land-Grant Colleges—USDA fertilizer-lime utilization program—all these have been factors in the development of organization at the state level which has been going on the past few months. Here is an outline of this activity, as nearly complete as we are able to present it at this stage. There is other activity, but it is not ready for publicity.

**KANSAS**—A meeting was held last December in Topeka, which was an idea which seemed to rise spontaneously from the industry and the College at the same time. At this meeting there was full discussion of the idea of a Kansas society, primarily to carry out the Fertilizer-Lime Program and to work with any national organizations. But the primary purpose in this case, as should be the case generally, was to increase Kansas farm income by promoting the use of fertilizers and lime.

At this meeting a steering committee was elected to help set up such an organization. This included Leon Baker, Jr., chairman, Snyder Chemical; Luther Willoughby, Kansas State extension division; Harold Saffrin, Kansas Agricultural Chemical Company; Cecil Fluty, Farm Belt Fertilizer and Chemical, and Wichita Fertilizer, Inc.; W. P. Glaspey, Blue Valley Fertilizer Company; Jim Gillie, Thurston Chemical.

Another meeting was held January 22, again in Topeka. At this meeting bylaws, prepared meanwhile by the steering committee, were read, amended and accepted. And this brought into being the Kansas Agricultural Advisory Committee, a non-profit corporation. This will get into action following a meeting called for February 26 at Topeka, when the formal organization will be perfected and a program formulated.

Eight fertilizer manufacturers, five material producers and Kansas State College personnel made up the 35 who attended.

Herb Davis, president of the #1 organization in the field, the South Carolina group, was principal speaker and answered questions on their problems and methods.

**COLORADO**—Elsewhere in this issue is a brief story on the meeting held in Colorado in January. The essence of this meeting was that a number of men there are talking with vigor about the possibility of forming an all-embracing association there.

**OKLAHOMA**—Shawnee Brown, Oklahoma A&M called a meeting in Tulsa to discuss what could be done about the Fertilizer-Lime Program, and this resulted in a decision to create an association in that State. Mr. Brown, Wesley Chafan and Dr. Pat Murphy, all expressed enthusiasm.

At the Kansas Meeting Standing in the back from left to right: Jim Gillie of Thurston Chemical Company; W. P. Glaspey, Blue Valley Fertilizer Company; H. B. Davis, President of South Carolina plant Food Educational Society; Harold Saffrin, Kansas Agricultural Chemical Company; L. E. Willoughby, Supervisor of Extension, Kansas State College; Mike Burns, Capper's Farmer; Leon F. Baker, Jr., Vice-President and General Manager, Snyder Chemical Company, Topeka, Kansas, and chairman of the steering committee for the formation of the association.

A steering committee was appointed here, too, with C. C. Crawford, Sunset Chemical, as chairman and a five-man group to draw by-laws and a program, to be presented February 23 at a meeting which has been called.

**TEXAS**—During the annual fertilizer conference at College Station, the need was recognized for an organization, and a committee appointed to explore the subject. This is composed of James D. Dawson, Jr., Fidelity Chemical; Tom Wright, Texas Farm Products Company; B. L. Henderson, Campbell Fertilizer Company. The next meeting will be at the Rusk Hotel, Rusk, Texas, February 17 at 7:30.

**LOUISIANA**—The organization here has not been completed, but has a board of directors, consisting of C. D. Shallenberger, Shreveport Fertilizer; Curtis Taylor, Arcadia Cotton Oil; Stanley Hackett, Dixie Fertilizer; Roy Fontaine, Guaranty Seed; A. L. Gayle Kelly-Weber; J. B. Snell, Minden Cotton Oil; Chester Green, Green & Reedy; W. F. Williamson, Louisiana Agricultural Supply. This board will call an organization meeting when its plans are perfected.

(Continued on page 69)



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# Reactions

By A. A. Nikitin and Josephine W. Rainey<sup>2</sup>

## BETWEEN TRACE ELEMENT SALTS AND N-P-K CARRIERS IN FERTILIZERS<sup>1</sup>

THE purpose of this study was to determine the relationships which may exist between trace element salts and N-P-K carriers in fertilizers. This study also concerns the development of a new and improved process for trace element use with N-P-K fertilizers. This process relates to the improved availability of trace elements used in combination with N-P-K carriers.

Very little direct information on trace element N-P-K relationships is available in the literature, and for that reason it was necessary to conduct extensive laboratory tests.

It was realized that trace elements and N-P-K carriers would be in contact with the inert ingredients of fertilizers, and for that reason the relationships between trace elements, N-P-K carriers, and various clays were also studied.

Studies on the performance of trace elements were concentrated around copper, zinc, manganese, iron and boron, as the most valuable trace elements for fertilizer use. These elements were studied in various forms for their chemical reactions with compounds of nitrogen, phosphorus, potassium, calcium, and magnesium, such as would be found in fertilizers and soils. The condi-

tions of these tests were varied for pH, concentration, and temperature.

### METHOD AND MATERIALS

The availability of trace elements when used in combination with N-P-K was determined on the basis of their soluble salts, such as sulfates of copper, zinc, manganese and iron, and sodium tetraborate. The trace element salts used were of regular technical grade. Fertilizer grade superphosphate containing 20.2% P<sub>2</sub>O<sub>5</sub>, triple superphosphate, and commercial N-P-K of 6-8-6 formula were the N-P-K carriers used. Other chemicals were of the regular technical grade. All materials for these experiments were acquired in large amounts, in order to assure uniformity throughout the entire investigation. The trace element salts were used at concentrations similar to those in commercial fertilizers.

The trace element salts were thoroughly blended with N-P-K or superphosphate, and stored for a definite period. The mixtures of N-P-K, or superphosphate, and trace element salts were then agitated in water for 24 hours. In specified cases heat was employed, but as a rule the tests were carried out at room temperature (68° F). The suspensions were filtered through double Whatman #30 filter paper, in a Buchner funnel. The filtrate volume was readjusted and quantitative analyses were made for the trace elements.

The method of determining trace element availability by these tests was based on the leaching principle, involving the assay of the soluble trace elements in a water suspension of N-P-K and trace element salts.

Most of the mixtures were analyzed for trace elements within 3 or 4 days after mixing; however, several mixtures were prepared which were analyzed after 2 to 6 weeks of aging.

### RESULTS AND DISCUSSION

#### The Trace Elements as They Appear in the Periodic Table

It is interesting to note that the trace elements, manganese, iron, cobalt, copper, and zinc, which have proved to be of extensive value in agriculture, have adjacent positions in the periodic table, and consecutive atomic numbers. Thus some similarities between these elements would be expected. Cobalt was not included in our studies because its value is related chiefly to animal nutrition.

Manganese, iron, and copper exhibit a similarity from the standpoint of their oxidation-reduction potentials. Both manganese and iron may be readily oxidized from divalent to trivalent state; however, manganous ion is more stable than ferrous ion. Copper may also be easily oxidized from monovalent to divalent state. It is more commonly used in the divalent cupric state, which is the more stable of the two.

Copper and zinc form ammonium complex ions. This seems to have a particular value for the function of these elements in reducing excessive concentrations of ammonium ion in fertilizers.

Zinc oxide has amphoteric properties in that it may act either as an acid or alkali, depending upon the character of the chemical reaction in which it is involved.

Boron is in an adjacent position to

(1) Presented before the Fertilizer Division, American Chemical Society, New York, September 7, 1951. Received for publication March 22, 1952. Published in October 1952 *Agronomy Journal*.

(2) Director of Agricultural Research and Research Chemist, respectively, Tennessee Corporation Research Laboratories, College Park, Ga. The authors wish to express their appreciation to Dr. J. K. Plummer, Chairman, Research Committee, Tennessee Corporation, for his valuable advice, and to Messrs. E. S. Woolner and F. L. Robinson for their analytical services, without which the large numbers of laboratory experiments would have been impossible.

carbon in the periodic table. In reference to that position, it may be stated that organic hydroxyacids such as mannitol monoborate, which contain both boron and carbon, play an important role in overcoming excessive alkalinity in plants.

The equilibrium between di-, tri-, and tetra-valent compounds of manganese has been graphically presented by Quastel (5), as is shown in figure 1. Oxidation-reduction of manganese, as it may affect the element's availability, is clearly illustrated in this figure.

#### Relationships Between Phosphates and Trace Elements

It is a commonly accepted idea that phosphates form insoluble compounds with trace elements; however, laboratory studies showed that regular commercial superphosphates had only a slight diminishing effect on trace element solubility.

Results on the comparative sorption of trace elements by N-P-K (6-8-6) and superphosphate, as presented in figure 2 show that there was much higher sorption of copper by N-P-K (nonacid-forming) than by superphosphate. In all cases the difference between the sorption of zinc and manganese by N-P-K and

superphosphate was not as great as that of copper. Higher sorption of trace elements by N-P-K (6-8-6) than by superphosphate may be due to the alkalies, such as ammonia and dolomite, which are present in complete fertilizers.

Our results are in agreement with the findings of Steckel, *et al.* (6), and Forsee<sup>3</sup>, who showed that manganese availability was not impaired in the presence of superphosphate. Jamison (3) also found that moderate amounts of superphosphate did not reduce the availability of zinc.

#### The pH is Major Factor in Sorption of Trace Elements by N-P-K

Very often the precipitating action of N-P-K carriers on trace elements may be attributed to high alkalinity of the fertilizers. In order to determine the difference in sorption of trace elements by acid and non-acid fertilizers, the following three kinds of N-P-K fertilizers were employed in our tests:

- 1) Acid-forming.
- 2) Nonacid-forming, adjusted with ammonia.

(3) From private correspondence with Dr. W. T. Forsee, Everglades Experiment Station, Belle Glade, Fla., 1948.

3) Nonacid forming, adjusted with lime.

Comparative results on trace element sorption by acid-forming fertilizer of pH 3.8, and nonacid-forming fertilizer, adjusted with ammonia to pH 6.8, are presented in figure 3. The results in this figure show that sorption of zinc and manganese was substantially higher in nonacid-forming fertilizer than in acid-forming fertilizer. It is interesting to note that the sorption curves at pH 3.8 remained virtually parallel with those at pH 6.8 during the course of this investigation. There was much less difference in the sorption of copper at these two pH values, therefore, it will be seen that, besides pH, other factors such as surface phenomena may be responsible.

To further study sorption of the trace elements by fertilizer treated with ammonia, tests were made using N-P-K (6-8-6), with the pH adjusted as high as pH 9.

The results presented in figure 4 show that copper sorption rapidly diminished above pH 6.5. Analysis of the filtrate showed the presence of the cuprammonium complex compound, which is readily soluble in water. Filtrate analysis did not indicate much zinc in solution above pH

#### EQUILIBRIUM BETWEEN DIVALENT, TRIVALENT AND TETRAVALENT FORMS ON MANGANESE COMPOUNDS IN WHICH MICRO-ORGANISMS PLAY AN IMPORTANT PART

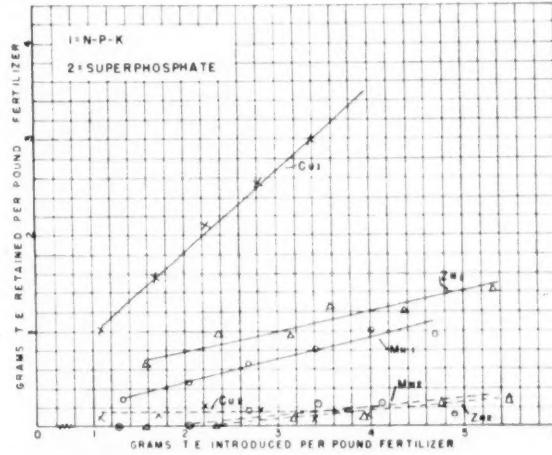
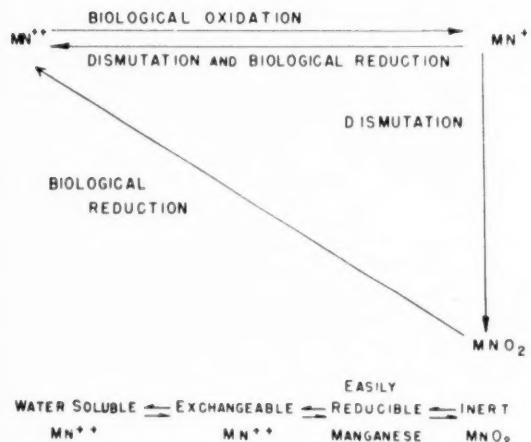


FIG. 1 Left—From J. H. Quastel, *Jour. Agri. Sci.* 38, part 3.

FIG. 2 Above—Comparative sorption of trace elements by N-P-K and superphosphate.

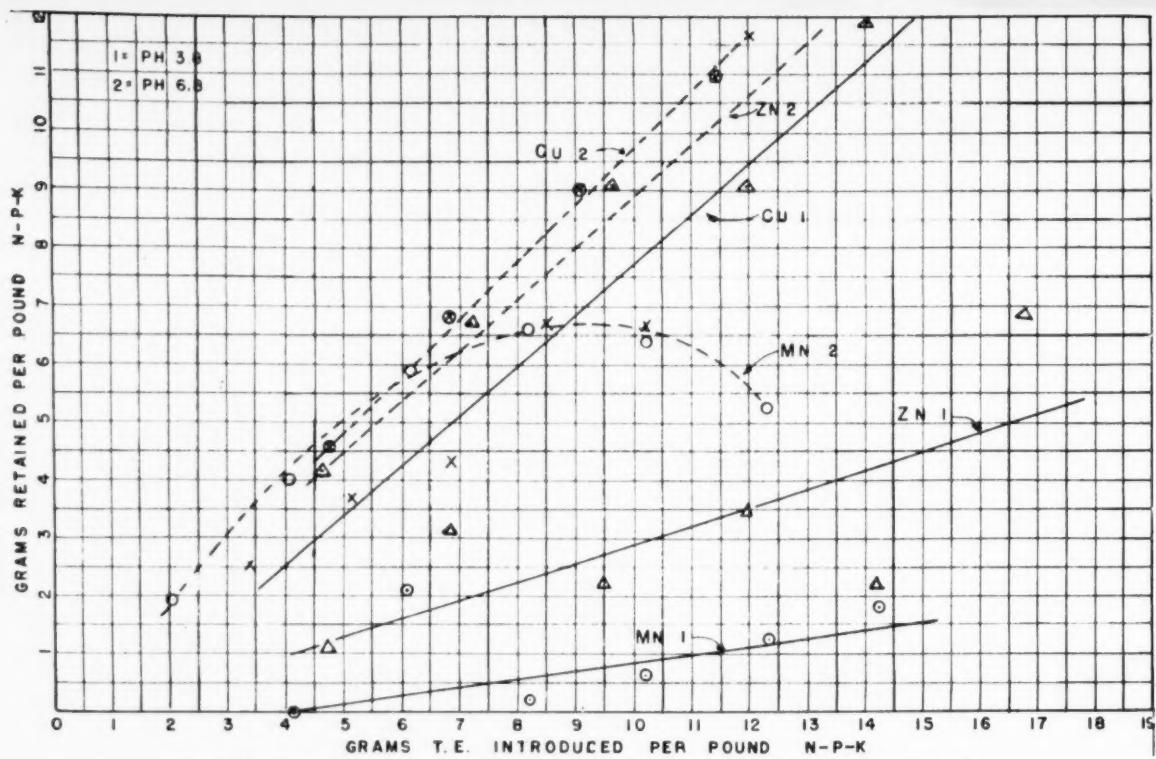


FIG. 3. Sorption of trace elements by N-P-K at pH 3.8 vs. pH 6.8 (pH adjusted with ammonia)

6.5; however, there was a considerable amount of soluble manganese present up to pH 7.5. At pH 8.0 maximum sorption of manganese was obtained. These results are in agreement with the work of Carr and Brewer (2), who detected the presence of soluble manganese in the soil up to pH 7.9.

Nonacid-forming fertilizers adjusted with lime were also studied with regard to sorption of trace elements. Results of these tests are presented in figure 5 showing that maximum

sorption of copper and zinc was reached at pH 5. The sorption of manganese had not reached a maximum point at a pH of 6, where a substantial amount of available manganese still remained in solution.

The distinct difference in sorption of trace elements by N-P-K at various pH values, adjusted with ammonia and lime, is that in the case of ammonia, copper and zinc retention diminished above pH 6.8, due to the formation of the cuprammonium and zinc ammonium com-

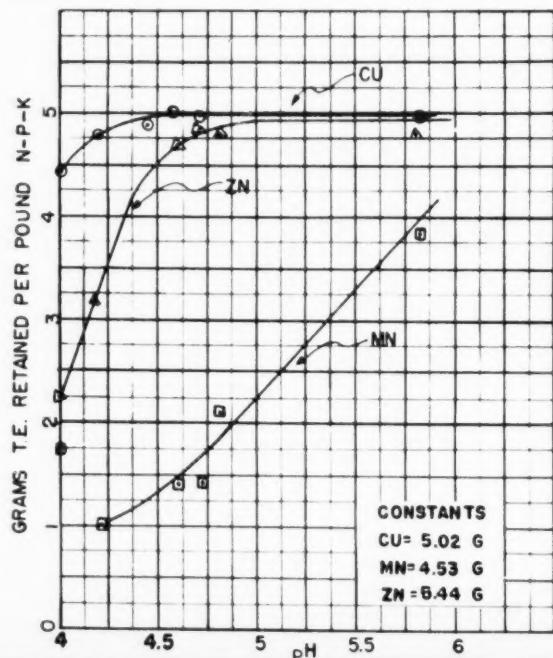
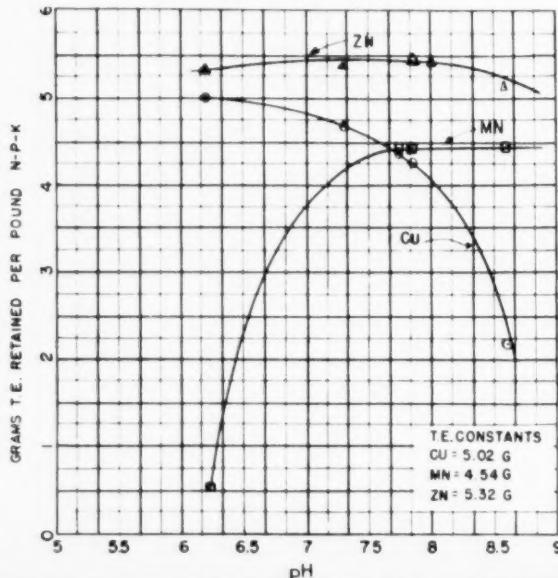
plex, while in the case of lime, the retention of copper and zinc remained constant above pH 5.0. These results show that precipitation of copper and zinc in the presence of lime takes place at a lower pH than in the presence of ammonia.

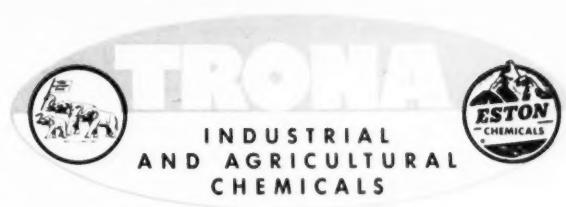
There is some difference in the performance of calcium lime and magnesium lime, which is due to two factors:

1) Difference in solubility of the sulfates.

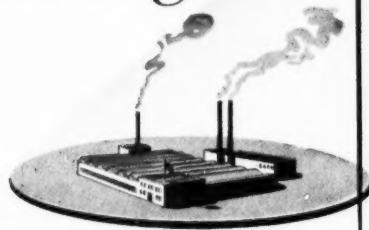
FIG. 4 Below Effect of pH as adjusted with ammonia on the sorption of trace elements by N-P-K.

FIG. 5 Right Effect of pH as adjusted with lime on the sorption of trace elements by N-P-K.





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2) Difference in amount of water of crystallization.

In order to maintain the availability of trace elements when used in combination with N-P-K, it is particularly important to reduce direct contact between the trace elements and ammonia or any other alkaline materials in the fertilizer. For this purpose it is suggested that a certain period of time be allowed for completion of the reaction between ammonia and N-P-K, before addition of the trace elements. Table 1 illustrates the solubility of trace elements mixed with N-P-K by various methods.

#### Effect of Nitrogen Compounds

In the fertilizer industry it has been found necessary to obtain a certain concentration of nitrogen in complete fertilizers, either by direct ammoniation, or by the introduction of ammonium salts as diammonium phosphate, ammonium sulfate, or ammonium nitrate. With this idea in mind, the effect of ammonium salts on the sorption of trace elements by N-P-K was studied in the laboratory. Results presented in figure 6 show that when ammonia was used in combination with ammonium nitrate and ammonium sulphate to adjust the pH of N-P-K, maximum sorption of copper was reached at about pH 6. While maximum sorption of zinc in this case was also reached at pH 6, it was much slower than the sorption of copper. The sorption of manganese in the presence of the ammonium salts was slower than that of zinc or copper, and it was still not complete at pH 6.0. Analysis of the filtrate showed that a substantial amount of manganese remained in solution at pH 6.0.

#### Effect of Iron Salts

Laboratory tests were conducted to determine the effect of ferric sulfate on the sorption of trace elements by N-P-K. The results of these tests, as presented in figure 7, show that by increasing the concentration of ferric salt, the sorption of zinc, copper, and manganese by N-P-K was decreased. Further studies show that the reason for this was that iron precipitated the phosphate ion of

Table 1.—Comparison of solubilities of trace elements mixed with fertilizer by various methods.

Mixtures analyzed immediately	Trace element salts added before ammoniation		Trace element salts added after ammoniation		
	Copper %	Zinc %	Manganese %	Copper %	Zinc %
Aqua solution	77.78	73.40	51.82	88.97	74.50
Ammonium acetate	91.27	78.09	74.75	73.31	89.95
Ammonium citrate	92.07	91.97	97.58	94.12	92.69
After aging two weeks					
Available trace elements					
	Copper %	Zinc %	Manganese %	Copper %	Zinc %
Aqua solution	18.45	21.65	50.85	24.07	28.10
Ammonium acetate	40.99	42.20	45.01	84.55	79.60
Ammonium citrate	83.27	85.47	91.45	95.93	87.94

the N-P-K. The results of Swenson *et al.* (8), and Struthers and Sieling (7) substantiate these findings.

#### Effect of Boron

Laboratory tests on the sorption of trace elements by N-P-K, in the presence of borax, show that only a slight increase in sorption took place as a result of the borax. This was due to the fact that, in our tests, borax was introduced after trace elements were distributed uniformly throughout the N-P-K. In this way, contact between the trace elements and borax was reduced to a minimum. Results on the effect of borax on the sorption of trace elements by N-P-K are presented in figure 8.

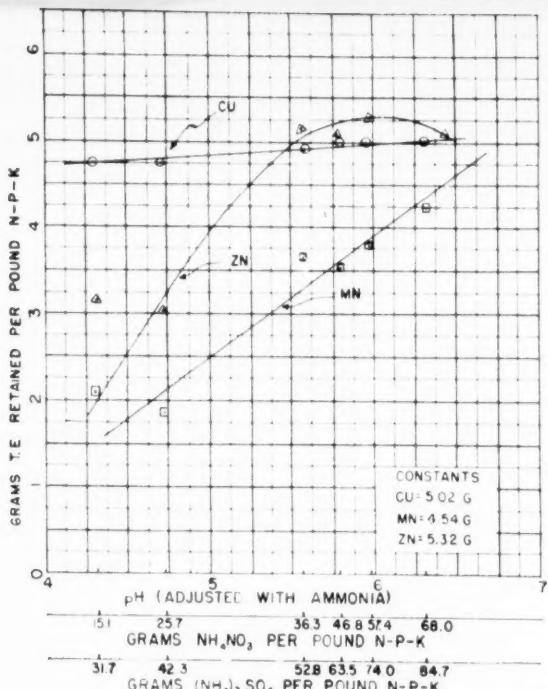
#### Relationships Between Trace Elements, Soil Components, and Inert Ingredients

The interaction of trace elements with soil components, such as clays and organic matter, may also affect trace element availability in fertilizers. Organic matter in the soil is an important factor governing the availability of trace elements. Excessive amounts of organic matter in soils will greatly reduce the availability of copper and zinc. Baumann (1) and Metzger (4) believed that humic acid in the soil was at least partly responsible for fixing copper and zinc. On iron and manganese, however, humic acid has a reducing action, rendering these elements more readily available in organic soils. Excessive acidity should be avoided in order to prevent leaching out of the trace elements from the soil.

In most cases organic matter in the soil helps to maintain a portion of the phosphate in readily available form. This is particularly advantageous in the presence of an excess of iron.

The inert ingredients in fertilizers may serve other purposes besides that of a diluent. They may be utilized effectively for minimizing the interactions between N-P-K carriers and trace element materials. In this connection, laboratory studies were made to determine the sorption of copper as influenced by different talcs and clays which may be used as inert fertilizer diluents. A suspension of each inert diluent was used in combination with various concentrations of copper sulfate, and agitated with a high speed stirrer for 24 hours. The filtrates from these suspensions were analyzed for soluble copper by standard A.O.A.C. procedures.

Results of these studies, presented in figure 9, are of interest, since they clearly illustrate the great variation in the sorption capacity of various diluents for such an important trace element as copper. It is interesting to note that New York talc (Talc NY) showed an even greater sorption of copper than did limestone. The sorption of copper by Vermont talc (Talc V.) was similar to that by Ohio gypsum. It seems that the pH is not the sole factor influencing the sorption of trace elements by various inert diluents, since surface phenomena should also be taken into consideration.



The weak precipitating action of phosphate on trace elements does not interfere with their availability when used with N-P-K carriers in fertilizers.

Studies on the comparative sorption of trace elements by superphosphate and N-P-K showed that superphosphate sorbed much smaller amounts of trace elements than did

FIG. 6.—Effect on NH<sub>4</sub>NO<sub>3</sub>, NH<sub>4</sub>OH, and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> on sorption of trace elements by N-P-K

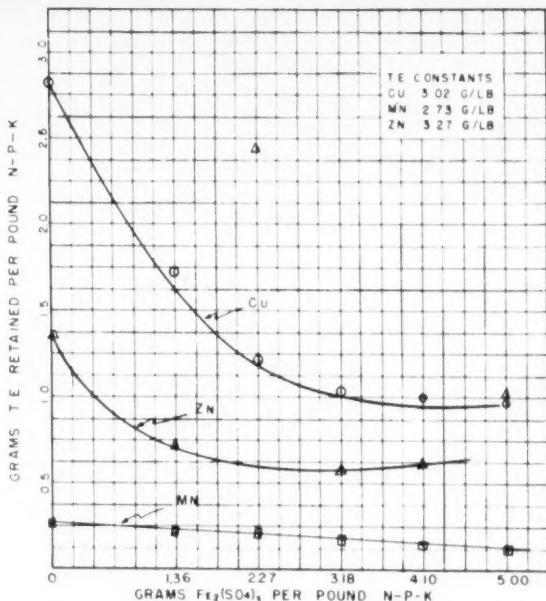


FIG. 6.—Effect on NH<sub>4</sub>NO<sub>3</sub>, NH<sub>4</sub>OH, and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> on sorption of trace elements by N-P-K

FIG. 7.—Effect of Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> in presence of constant amount of FeSO<sub>4</sub> on sorption of trace elements by N-P-K

#### SUMMARY

the nonacid-forming N-P-K fertilizer.

A substantially larger amount of copper than zinc or manganese was sorbed by N-P-K (6-8-6). Sorption of trace elements by N-P-K was considerably reduced in the presence of ferric sulfate.

The availability of trace elements in fertilizer depends chiefly upon

the extent of ammoniation of the fertilizer. There was less precipitation of trace elements if ammonia had been completely reacted with N-P-K before the addition of the trace elements.

Comparative studies on the effect of pH showed that, with ammonia present, copper sorption by N-P-K was diminished above pH 6.0 by

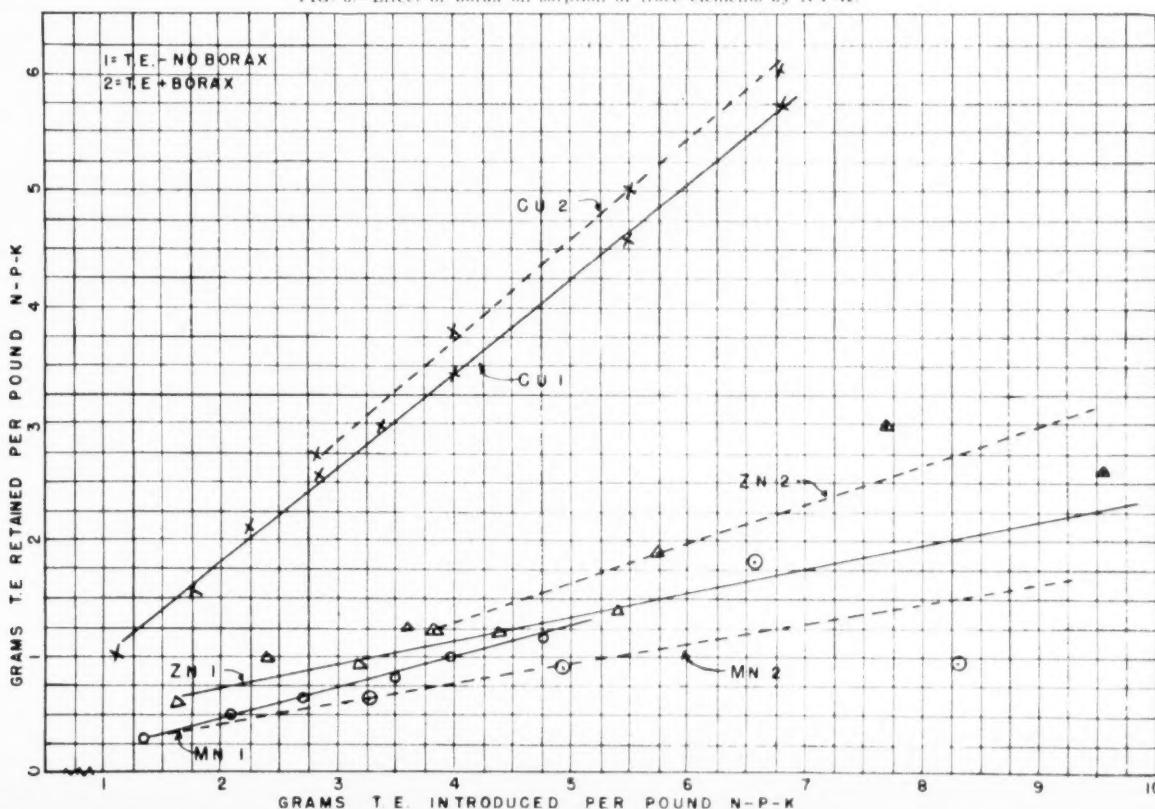
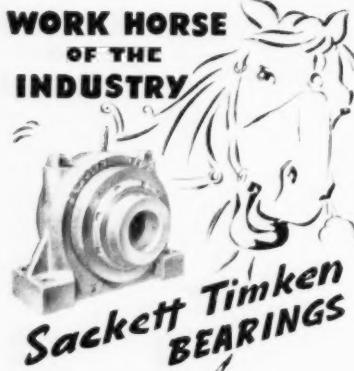


FIG. 8.—Effect of borax on sorption of trace elements by N-P-K



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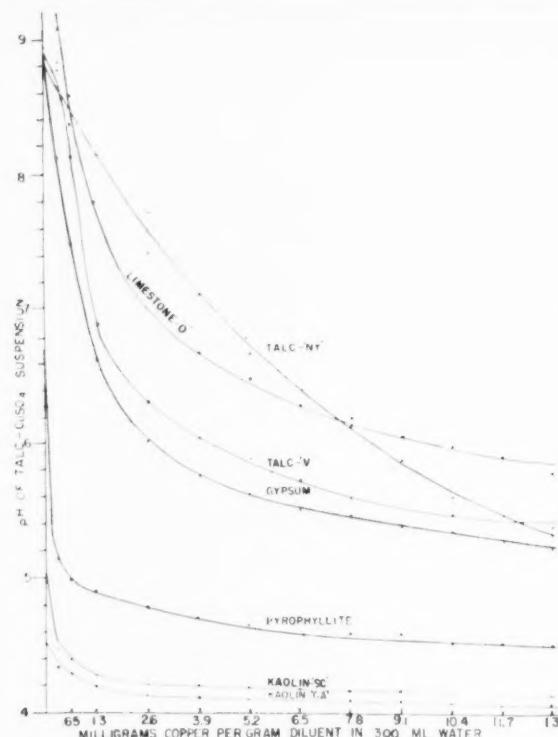


FIG. 9. Effect of pH of talcs and clays on their sorption of copper sulfate.

formation of the cuprammonium complex. When lime was used to adjust the pH, the sorption of copper by N-P-K was constant above pH 5.0.

The equilibrium between oxidation and reduction of manganese is of interest since the availability of manganese and iron depends a great deal upon these processes.

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# 6

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## ARKANSAS

**Stuttgart Ammonia Distributors.** Stuttgart, operated by **A. G. Meehan**, planter, and **W. O. Hazelbacker**, former county agent, is ready with a 33,000 gallon anhydrous ammonia distribution set-up for the Spring season.

## FLORIDA

**International Minerals & Chemical's** Bonnie plant, which is being constructed by **Rust Engineering** will be turning out defluorinated phosphate by March 15.

\* \* \*

**St. Regis Paper's** new kraft pulp, paper and board mill at Jacksonville is now in production, capable of turning out 100,000 annual tons, and raising the company's capacity to 560,000 annual tons. It has been planned for future enlargement. **Merritt-Chapman & Scott** were general contractors, while the engineering was in the hands of **Stevenson and Rubens**, with **Johnson & Company** as consulting engineers. **William R. Adams**, St. Regis vice-president, directed the operation, with chief engineer **Justin H. McCarthy** supervised design and construction. **John K. Ferguson** is resident manager, and **John A. McDermott** is general superintendent.

G. L. Noble, director of the National Committee on Boys and Girls Club Work, discusses the new National 4-H Alumni Recognition Program with S. L. Nevins, president, Mathieson Agricultural Chemicals Company, of Little Rock, Arkansas. Mathieson is the donor of awards in the new program, as reported here last month.



## \$35,500,000 IN NEW FLORIDA PHOSPHATE

The federal government has granted certificates of necessity for \$35,500,000 to Florida phosphate companies in the last six months for construction of plants to extract uranium as a by-product. All are in the big phosphate producing area of Polk and Hillsborough counties.

The firms and the amounts of the certificates of necessity, granting priority in construction, were:

**Davison Chemical Corp.**, Ridgewood, \$12,410,000; **International Minerals and Chemical Corp.**, Bartow, \$9,718,340; **Armour and Co.**, Bartow, \$5,608,000; **Virginia-Carolina Chemical Corp.**, Nichols, \$5,274,745; **United States Phosphoric Products Corp.**, Tampa, \$1,671,440; and **Coronet Phosphate Co.**, Boyett, \$850,313.

Here is a summary of the principal construction to date:

1. **International Minerals and Chemical Corp.** — huge \$10,000,000 plant at Bonnie has been under construction for a year and a half and is nearing completion. The guess is that it will be opened in February.

The plant will make multiple superphosphates, by improved pro-

cesses, with uranium to be obtained as a by-product. It will be the first plant to produce uranium in the phosphate fields here.

2. **Davison Chemical Corp.** started work in September on a triple superphosphate plant which will make triple superphosphate.

3. **Virginia-Carolina Chemical Co.**, Nichols, west of Mulberry—has taken out three certificates of necessity for a total of \$5,274,000 and construction is under way.

4. **Armour Fertilizer Works** took out a certificate in October for \$5,608,000 in construction to start mining operations, not now a part of the company's operations in Florida.

The present plant now makes triple superphosphate, but no announcement has been made as to whether plans are under way to produce uranium.

5. **United States Phosphoric Products Corp.** — the company took out two certificates in September for a total of \$1,671,000. The expenditures were for "expansion and production of sulphuric acid and triple superphosphate," officials said.

6. **Coronet Phosphate Co.**, at Tenorio Mine, Saddle Creek — the company took out a certificate of necessity in October for \$850,313 for new drying plant and storage facilities. As yet not connected with uranium recovery, but the company is said to be doing research.

## GEORGIA

**St. Regis Paper** has acquired forest management and timber cutting rights to 34,200 acres in Worth and Turner counties — an area about 150 miles from the Jacksonville, Florida plant (see above). The contract runs for 60 years. This is in addition to other such rights — 217,000 acres in Georgia and 47,500 in Florida, both within 100 miles of the new plant.

\* \* \*

**Central of Georgia Railroad** is building a new steel and concrete warehouse at its Savannah waterfront terminals with a capacity of 50,000 tons of nitrate. The ware-



# Around the Map

house will be equipped with belt conveyors and elevators for handling bulk nitrate from shipside to storage and from storage to cars. This replaces the warehouse destroyed by fire last March.

**Agricultural Pest Control Corporation**, Atlanta, is seeking a \$10,000,000 RFC loan to do crop dusting via airplanes and tractor-drawn equipment. **L. L. Crosby**, who heads **Commonwealth Sanitation Corporation** in Pittsburgh, is president.

## INDIANA

**Davison Chemical** has announced plans for construction of a million dollar fertilizer plant at New Albany. The plant will be of latest design, incorporating facilities for production of Davison homogeneous granulated mixed fertilizer, and increased capacity to meet the demand for the company's products. The erection of the new plant is required because the newly constructed Ohio River Levee does not protect the present plant, located on the north bend of the river at Tenth and River Streets.

It will be designed and constructed by the **John J. Harte Company**, engineers and constructors, of Atlanta, Ga., and is scheduled for completion in the Fall of 1953.

Management will continue under **J. L. Gayle** as plant manager and **George Klein**, district manager at Nashville.

## MAINE

**Northern Chemical Industries**, is in production with the first liquid alum plant in Maine, where sulphuric acid is combined with bauxite. NCI is an affiliate of **Summers**

## Fertilizer.

## MICHIGAN

**Davison Chemical's** plant at Lansing will begin about the end of this month to produce granulated fertilizer. The plant was bought in 1951 from **Michigan Fertilizer** and a half million dollars have been spent in expansion, which includes — in addition to the granulation equipment — a new warehouse, containing eight 500-ton bins and an elaborate conveyor system.

## MISSISSIPPI

**Mississippi Chemical** broke ground January 5 for the \$4,750,000 expansion program of their year-old plant at Yazoo City. With the new capacity, the plant will have, according to executive vice-president **Owen Cooper**, a value of \$14,000,000 and a maximum capacity of 180 daily tons of anhydrous ammonia and 375 daily tons of ammonium nitrate.

## MISSOURI

**Missouri Farmers Association** has chosen **Dorr Co.** to design their \$3,500,000 Joplin plant, which is scheduled for completion in the Summer of 1954. It will have a daily capacity of 75 tons of phosphoric, and will produce superphosphate and mixed fertilizer. The association is setting up a 30,000 gallon anhydrous ammonia tank at Moberly, the first of 21 such tanks to be built in the state, MFA Exchange manager, **George Birdsong**, reports.

Universal Match Corporation, St. Louis, has established a new division to market agricultural chem-

icals, to be known as the **Planetary Chemical** division, and to be under the direction of **Robert G. Hayward, Jr.** as salesmanager. Chemicals will be produced by **Planetary Chemical Company, Inc.**, Creve Coeur, and include emulsifiers, insecticides, herbicides, fungicides, rodenticides and wood preservatives.

## NEW YORK

**McDougal-May, Inc.**, Plattsburg, has been granted a charter to produce fertilizers, with a capital stock of \$200,000. Directors are **Joyce J. MacDougal, Lynn May**, and **Stanley H. MacDougal**.

## TENNESSEE

**TVA** is reported ready to move into actual commercial production during the next few months with their nitric phosphate process. **Associated Cooperatives, Inc.**, Sheffield, Alabama, is building the first plant to use this process, and will be equipped to turn out 60,000 tons of mixed fertilizer a year, a 14-14-14 analysis. TVA's production for 1952, 15 per cent up from 1951, is reported at 376,000 tons of major phosphate and nitrogen fertilizers.

## TEXAS

**Pan American Sulphur**, Dallas, is raising \$3,500,000 by the sale of stock, which — plus a loan of \$3,64,000 will be used to build their sulphur extraction plant at Vera Cruz. (See Mexico).

## VIRGINIA

**Smith-Douglass Company**, president, **Ralph B. Douglass**, and **E. M. Fleischmann**, president of **San Jacinto Chemical Corporation**, manufacturer of anhydrous ammonia, with a long term lease on a government owned plant near Houston, Texas, announced last month that the two companies had entered into an agreement looking to a merger. The announcement points out that several matters remain to be explored before the transaction is consummated. Detailed terms of the contemplated merger were not announced but **Smith-Douglass Company**,

**The newest, best multiwall bags  
for valve-packing your fertilizer . . .**

# Bemis B-FLEX

# Valve Bags!

You should switch to Bemis B-FLEX promptly because . . .

1. **LOWER BAG COSTS.** You'll save up to \$4 per thousand compared with conventional inner-sleeve valve bags.
2. **LOWER PRODUCTION COSTS.** Faster handling on your packing machines.
3. **FASTER PACKING.** Are jam-ups a problem? Not with Bemis B-FLEX. No flapping inner-sleeve to slow down material flow.
4. **UNIFORM WEIGHTS.** You can hit your weights "right on the button." Stop over-packing.
5. **CLEAN PACKAGE.** Minimum sifting.
6. **BETTER CUSTOMER SATISFACTION.** No loose, torn sleeves to get into the farmer's drill.

And, of course, you get the added benefit of Bemis' crisp, bright, multi-color printing — the finest printing your brand can have on multiwall bags.

Ask your *Bemis Man* for the complete B-FLEX story.

# Bemis



General Offices  
St. Louis 2, Mo.  
Sales Offices in  
Principal Cities



When the fleece on the flock is long and heavy the rancher knows that his efforts will pay off in profits. Prime stock is fed prime feed to assure good meat, good wool—good prices.

While man supplies labor and knowledge, it's the soil that supplies the strength responsible for the growth of all living things. For from the soil come the vital plant-food elements that nourish all life. And to the soil these elements must be returned.

Many of the most effective soil-replenishing fertilizers contain POTASH, often Sunshine State Potash, a product of New Mexico. For Potash nourishes the soil with active ingredients that make for bumper crops and healthy flocks. In every way Potash proves a valuable profit-producing aid to a healthy state of business.



Reg. U. S. Pat. Off.

HIGRADE MURIATE OF POTASH 62/63% K<sub>2</sub>O  
GRANULAR MURIATE OF POTASH 48/52% K<sub>2</sub>O  
MANURE SALTS 20% K<sub>2</sub>O MIN.

UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York 20, N. Y.

February, 1953

Inc., is to be the surviving corporation. **F. Ebersstadt & Company, Inc.**, represented **Smith-Douglass Company** in the merger negotiations.

## WISCONSIN

**Wisconsin Farm Bureau** has announced that two of its major affiliates are now operating under one manager, **Ray L. Pavlak**, with headquarters in Madison. He has managed the plant food unit since its establishment in 1944. With the resignation of **James E. Rose**, Mr. Pavlak will take over management of their farm supply section. The combined volume of these two units ran to nearly eleven million dollars last year.

## BRAZIL

**W. R. Grace & Co.** will have a 55% interest in a new DDT and caustic soda-chlorine plant to be built in the Sao Paulo area. **American Home Products Corporation** and **Instituto Fontoura S-A** each will have a 22 1/2% share.

The plant will have an initial capacity of about four million pounds of DDT a year and ten tons of chlorine a day. The DDT will be manufactured for general agricultural purposes, household insecticides, and federal and state government use for public health services. At present Brazil must import all her DDT. Plans call for the new plant to supply the entire national requirements of Brazil. Construction is expected to get under way immediately with completion scheduled for 1954. Future plans call for expansion into other chemical products.

The Fontouras are prominent Brazilians who now own and operate successfully pharmaceutical and insecticide businesses. In addition, they are partners in the distribution of some American Home products and currently are building Brazil's first penicillin plant.

American Home Products manufactures a broad line of ethical and proprietary drugs, insecticides, home products, and prepared foods. Its more important subsidiaries are **Wyeth Incorporated**, **Ayerst, Mc-**

**Kenna & Harrison Limited**, **Ives-Cameron Co., Inc.**, **Whitehall Pharmaceutical Company**, **Boyle-Midway Inc.**, and **Fort Dodge Laboratories, Inc.**

W. R. Grace & Co. recently formed a new subsidiary, **Grace Chemical Company**. Its twenty-million dollar nitrogen plant is now under construction near Memphis, Tennessee. The company plans still further expansion in the chemical industry both in the United States and in Latin America.

## ISRAEL

**Chemicals and Fertilizers Ltd.** may be able to replace Greek imports of pyrites if the supply proves adequate which was found in the process of constructing the Beit Naftua dam in Galilee.

## JAPAN

**Nitto, Toyo, Ube, Showa Denko and Sumitoma** will be the principal suppliers of the ammonium sulfate being sold to Korea and the Philippines. **The Japan Procurement Agency** handled the sale of 222,800 tons in direct competition with US and British concerns.

## MEXICO

**Pan American Sulphur** (See Tex-as) is in process of financing a \$5,000,000 plant at Jaltipan, on land around the salt dome there. The plant is planned to produce between 300,000 and 600,000 annual long tons of sulphur, using the Frasch process, according to **President J. R. Parten**.

## PHILIPPINES

**National Power Corporation**, a government entity, will shortly complete the first ammonium sulfate fertilizer plant ever built in the Philippines. **Chemical Construction Corporation**, who are handling construction, have planned a plant to turn out 50,000 annual metric tons of ammonium sulfate, plus anhydrous ammonia and 98% sulphuric.

**U. S. D. A.**

**HAS BEEN**  
**REGROUPED**

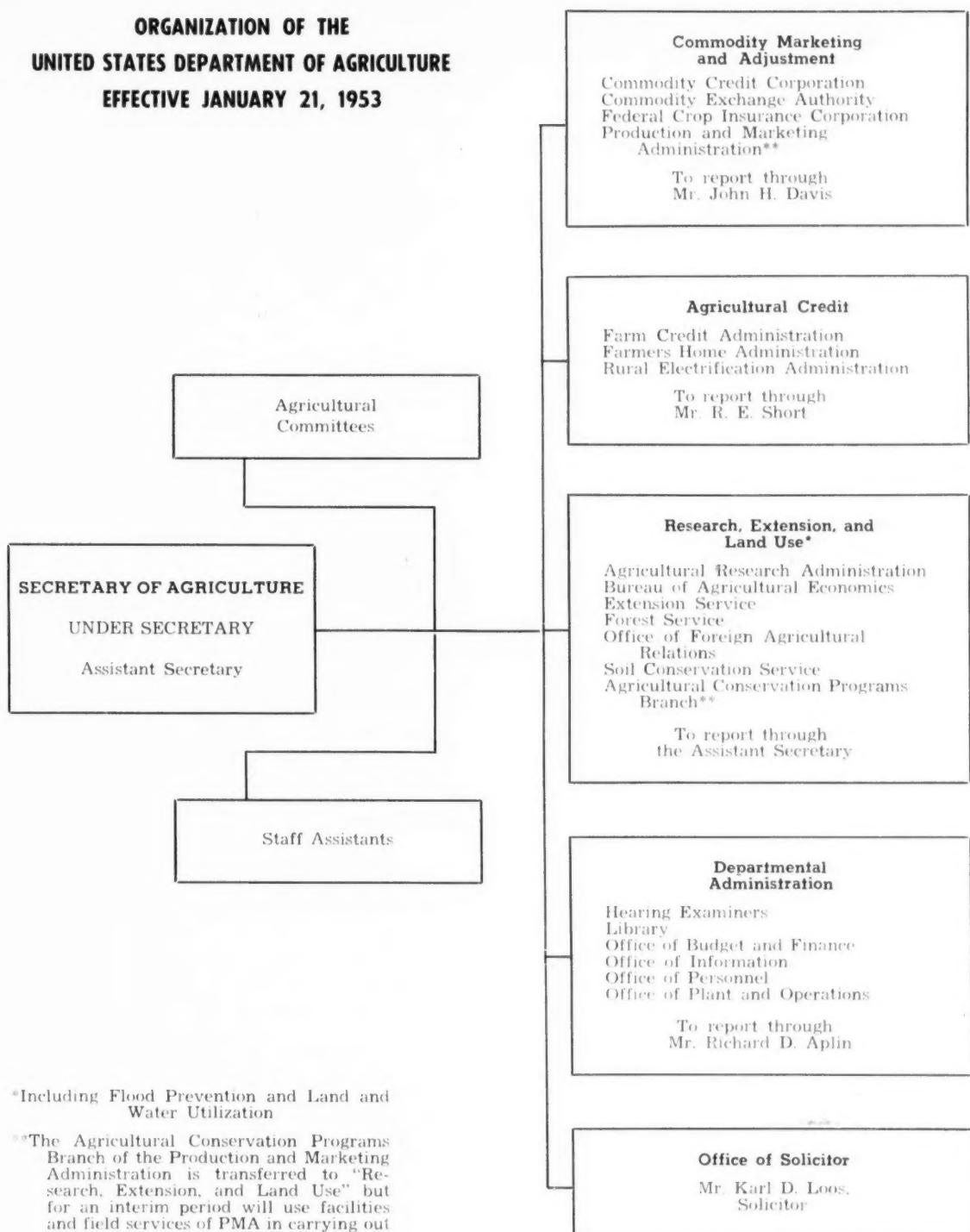
Ezra Taft Benson, Secretary, announced January 22 that he is regrouping USDA department's services into four divisions for administrative purposes. Another division, that of the Solicitor's Office, will remain as presently constituted.

"This action," stated Benson, "will make possible a closer coordination of related activities. All the regrouped agencies retain their present structure with the exception of the Agricultural Conservation Program. This will be transferred from the Production and Marketing Administration and placed with the Research Extension and Land-Use Group.

"What we intend is a gradual streamlining of the Department's services in the interest of economy and greater efficiency. The action is taken after weeks of study and conferences with congressional leaders, the members of the President's Committee on Re-organization, our own Interim Agricultural Advisory Committee, and members of the Hoover Commission."

On the next page are shown the four groups, the agencies in each, and the officials who will head them. The four group heads, along with Secretary Benson: True D. Morse, Under Secretary; Karl D. Loos, Solicitor; the executive and administrative assistants and such consultants as are designated will form a policy forming and planning group that will meet weekly to chart the course of the new agricultural administration, according to Mr. Benson.

**ORGANIZATION OF THE  
UNITED STATES DEPARTMENT OF AGRICULTURE  
EFFECTIVE JANUARY 21, 1953**



\*Including Flood Prevention and Land and Water Utilization

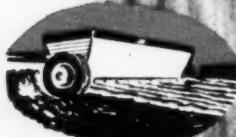
\*\*The Agricultural Conservation Programs Branch of the Production and Marketing Administration is transferred to "Research, Extension, and Land Use" but for an interim period will use facilities and field services of PMA in carrying out the Agricultural Conservation Program.

# DAVISON

GRANULATED  
SUPERPHOSPHATE  
offers 3 way Control



**1. STORAGE CONTROL**—will not cake or lump while in storage.



**2. APPLICATION CONTROL**—drills free and even . . . does not bridge over in the drill.



**3. FOOD CONTROL**—supplies uniform amount of plant food at desirable rates.

Davison's Granulated Superphosphate with 3-way control can mean added sales for you!

No longer is it necessary for you or the farmer to worry about lumping or caking . . . Davison's Granulated Superphosphate will store without becoming hard or caked. And when the farmer starts to apply Granulated Superphosphate in the field he will find there is no dusting nor will it bridge over in the drill. Granulated Superphosphate drills freely and evenly giving complete coverage. Because of the granular structure, plant food is released at desirable rates.

For added sales points be sure to get *Davison's Granulated Superphosphate with the 3-way control!*

Progress Through Chemistry

THE DAVISON CHEMICAL CORPORATION



Baltimore 3, Maryland

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS



# FULTON TIME-TESTED COTTON BAGS for FERTILIZER



Fulton's 36" 3.60 yard sheeting — makes a 100 lb. fertilizer bag that has given universal satisfaction from the time it was introduced by Fulton a few years ago.

Extra value appeal of cotton bags to farm women is unquestioned. Actual worth of the sewing material she reclaims from cotton bags (about 21½ yards per ton) far outweighs the small additional costs over bags that positively have NO re-use value. Extensive publicity in national magazines, radio and television, and consistent advertising in farm publications, has kept interest in sewing with cotton bags at high pitch.

Give your fertilizer sales appeal far beyond the analysis tag. Lift your brand above the common herd. Win new markets and build up your old ones with Fulton's attractive, useful and high quality cotton bags. It's not too late. Call your nearest Fulton branch now and get the benefit of sales building cotton bags for your fertilizer this season. Why not call now?

***Fulton* BAG & COTTON MILLS** Atlanta • New Orleans • Dallas • St. Louis • Denver  
Los Angeles • Kansas City, Kans. • Minneapolis • New York City, 347 Madison Ave. • Winter Haven, Fla. • San Francisco • Phoenix

# Safety -

## SOUTHERN GROUP TO MEET IN ATLANTA MARCH 2-3

### FERTILIZER SECTION HOTEL ATLANTA BILTMORE, POMPEIAN ROOM

Chairman: V. S. Gornto, Smith-Douglass Co., Inc.

Monday Afternoon, March 2—2:00 P.M.—**Informal Conference on Fertilizer Plant Safety**—Conference Chairman A. B. Pettit, Supervisor, Industrial Health and Safety, Davison Chemical Corporation

Panel Members: G. F. Dieta, Safety Director, Fertilizer Manufacturing Cooperative, Inc., Baltimore, Maryland; F. W. High, Manager of Operations, Baugh Chemical Company, Baltimore, Maryland; C. A. Cox, Assistant Manager, Manufacturing Department, Virginia-Carolina Chemical Company, Richmond, Virginia; E. F. Carnell, Superintendent, Davison Chemical Company, Savannah, Georgia.

There will be no speeches. Fertilizer plants are requested to submit specific safety and fire protection questions, in writing, to Mr. Pettit by February 15. Specific questions may also be submitted from the floor; however, preference will be given the written questions submitted in advance. While the discussion leaders will attempt to answer the questions submit-

ted, those in attendance will be encouraged to participate in the discussion.

Tuesday Afternoon, March 3—2:00 P.M.—Introduction of distinguished guests.

2:10 P.M.—"The Maintenance Foreman's Responsibility"—O. R. Kiphart, Safety Supervisor, Phillips Chemical Company, Borger, Texas.

2:40 P.M.—"The Importance of Fire Prevention"—Walter Zielenske, Fire Prevention Engineer, Marsh and McLennan, Chicago, Illinois.

3:10 P.M.—"Housekeeping in Fertilizer Manufacturing Plants"—E. O. Burroughs, Jr., Manager, Insurance Department, F. S. Royster Guano Company, Norfolk, Virginia.

3:30 P.M.—"Before and After"—A. C. Thornton, Industrial Relations Manager, International Minerals and Chemical Corporation, Chicago, Illinois

4:00 P.M.—General Discussion

### FERTILIZER GROUP GETS SECTIONAL STATUS

Word has been received from John Smith, Chairman of the fertilizer safety group, that the fertilizer group has now achieved sectional status in the Nation Safety Council.

A. B. Pettit of the Davison Chemical Company made the presentation to the policy committee of the Industrial Section of the National Safety Council in New York December 15 and gained approval for sectional status.

Sectional status will provide a much wider scope of activity for the Fertilizer Section and will grant recognition to this industry which has expanded so rapidly from the standpoint of accident and fire prevention.

### SAFETY TRAINING COURSES OFFERED

The 1953 sessions of the National Safety Council's Safety Training Institute will open with a five-day

course on the "Fundamentals of Industrial Safety," to be held Feb. 16-20.

This basic course, designed to help men presently engaged in industrial accident prevention gain a better understanding of occupational safety principles and methods, will be offered six times during the year.

Among the subjects included in classroom work are accident records, safety inspections, workmen's compensation, industrial health problems, machine guarding, electrical hazards, fire prevention, personal protective equipment, personal factors and supervision.

During the six years the course has been offered by the Council, some 1,000 safety men from all over the world have attended its sessions. Instructors for the course are specialists drawn from the Council's staff.

Those attending the course not only have the opportunity of exchanging views with others who also work in the field of industrial safe-

ty, but they become better acquainted with the Council's personnel, facilities and services. Training materials and technical consultation are available.

Many firms make the course an integral part of indoctrination into the plant safety department. Shell Oil Co., Oliver Corp., and the American Radiator and Standard Sanitary Corp., for example, have sent more than 10 men each over a period of years, and many others have enrolled several men in the course.

For safety personnel interested in more advanced work, a one-week course on "Safety Management Techniques" is offered by the Safety Training Institute. Assuming a knowledge of the fundamentals of accident prevention, the course stresses those managerial techniques required of top-notch safety personnel. Some of the topics included are psychology, leadership, human relations, public speaking, writing, conference leading as these subjects.

(Continued on page 46)

# *A Smith Douglass* PLANT SHOWS THE WAY

Prior to July, 1947, Smith-Douglass, like most fertilizer manufacturing companies in Virginia and throughout the United States, had no organized Safety or Accident Prevention Program.

In 1947 a company-wide Accident Prevention Program was organized in the Smith-Douglass Company. V. S. Gornto was the Director of this program, which was organized with the help and advice of the Safety Engineering Department of the Glens Falls Indemnity Company, the insurance company carrying Smith-Douglass Workmen's Compensation insurance. Prior to July, 1947, Smith-Douglass had a very bad Safety Record. In fact, the record was so bad that the insurance company then carrying the Workmen's Compensation insurance refused to renew the policy. It was at this time that Glens Falls took over the Workmen's Compensation account of Smith-Douglass. Immediately thereafter the Accident Prevention Program was organized and put into effect.

Before establishing the Smith-Douglass Accident Prevention Pro-

gram, the company averaged from 40 to 100 lost-time accidents each calendar year. In 1946, the year immediately preceding the inauguration of the company's Accident Prevention Program, the company had 65 lost-time accidents. The company-wide Accident Frequency rate for the calendar year 1946 was 41.53. During the calendar year of 1951, the company had only five lost-time accidents. The Accident Frequency Rate for the calendar year 1951 was 2.88. In 1952 the company had eight lost-time accidents and the Accident Frequency Rate last year was 5.02.

Up until the time the Accident Prevention Program was commenced by the Smith-Douglass Company, there was no organized state or national safety movement anywhere in the fertilizer industry.

In 1948 Mr. Gornto, along with representatives from Virginia-Carolina Chemical Company, F. S. Royster Guano, Robertson Chemical Corporation, Swift and Company, Southern States Cooperative, and one or two other Virginia fertilizer manufacturing companies, organized a Fertilizer Section in the Annual

Virginia State-wide Safety Conference. Since 1948 the Virginia State-wide Safety Conference has had a very active Fertilizer Section. Mr. W. C. Richardson of Southern States Cooperative is Chairman of the Fertilizer Section of the Virginia State-wide Safety Conference. The next meeting will be held in Roanoke in May of this year. Since organizing the Fertilizer Section in the Virginia State Safety Conference the Frequency Record in the fertilizer industry in Virginia has gradually declined. The improvement in the state-wide Frequency Rate has not been nearly as great as the improvement in the Smith-Douglass rate. This is due to the fact that many of the smaller fertilizer manufacturing plants in the state have thus far failed to join the state-wide safety organization and are still having frequent serious industrial accidents due to the lack of any Safety Program.

In 1951 the Fertilizer Section was organized as a part of the National Safety Council. Mr. Gornto is Vice Chairman of the Fertilizer Section of the National Safety Council and is Program Chairman for the 1953

## **ACES TO BE PROMINENT DURING ATLANTA SAFETY MEETING**



Burroughs



Pettit



Gornto

Safety Congress which meets in Chicago during the week of October 19 to 23. The entire fertilizer industry has recognized the splendid work the Fertilizer Section of the National Safety Council has accomplished during its short existence.

There was a Fertilizer Section organized as a part of the Southern Safety Conference in 1952. Mr. Gorto was asked to organize this section, to arrange the program, and serve as General Chairman of the Fertilizer Section. The 1952 meeting was held in Atlanta on March 3. Mr. Gorto was re-elected General Chairman for 1953. This year's meeting will be held in Atlanta on March 2 and 3 at Hotel Atlanta Biltmore.

North Carolina was the second state to have a Fertilizer Section organized as a part of the Annual State-wide Safety Conference. The Fertilizer Section in North Carolina was organized in 1952. Mr. Gorto was asked by the Director of Safety for the North Carolina State Industrial Commission to organize a Fertilizer Section, arrange the program, and state the first meeting, which was held in Asheville on May 6. Mr. C. J. Watts, Jr., of Naco Fertilizer Company at Wilmington, North Carolina, was named Chairman of the North Carolina Fertilizer Section. The 1953 meeting of the Fertilizer Section of the North Carolina State Safety Conference will be held in Winston-Salem on May 18 and 19.

The Safety Director of the North Carolina State Labor Department has just recently organized an intensive safety campaign in the fertilizer industry in North Carolina. This special, educational, two-year, Safety Program was begun in the fertilizer industry in the state of North Carolina at the direction of Mr. Forrest H. Shuford, the Commissioner of Labor of the state of North Carolina, and at the request of Mr. Gorto. The goal for this two-year, intensive, safety drive is to reduce the number of industrial accidents in the fertilizer industry in the state by at least 50%.

Mr. Clyde W. Moore, Production

Superintendent at the Smith-Douglas Kinston plant, is a member of the Executive Committee of the Fertilizer Section of the 1953 North Carolina State Safety Conference. Mr. E. B. Peacock is the branch manager at Kinston and is directly responsible for the enforcement of the Safety Program in the Kinston plant. Mr. M. L. Duke is the Safety Inspector. The Kinston plant now stands number one in the company-wide Safety Contest from the standpoint of working the greatest number of days without a reportable (lost-time) accident. The last lost-time accident at the Kinston plant was on March 23, 1949. When the Smith-Douglas Safety Program was organized, the Kinston plant was just about in line with the overall safety record. In 1947 the Kinston plant sustained three lost-time accidents and had a Frequency Rate of 30.47. Since the Accident Prevention Program was started in 1947, the Kinston plant has had a total of only three lost-time accidents. The plant has now operated three successive calendar years without a lost-time accident and has been awarded special "Merit Certificates of Honor" by the United States Department of Labor and the North Carolina Department of Labor for the last three calendar years. If no lost-time accidents occur prior to March 23, 1953, the Kinston plant will have worked four full years without a lost-time accident. Mr. Gorto states that the splendid Safety Record of the Kinston plant is due to the whole-hearted cooperation of Manager Peacock, Superintendent Moore, Safety Inspector Duke, and all the employees at the Kinston plant.

The Smith-Douglas Company is headed by Mr. Ralph B. Douglass of Norfolk as President. The other officers of the company are: Mr. W. B. Copeland, Vice President; Mr. J. A. Monroe, Vice President; Mr. J. A. Culpepper, Vice President; and

**SAFETY SAVES  
MEN AND MONEY**

Mr. W. F. Powers, Secretary. Mr. J. H. Zwemer is Director of Production and Research.

### **SAFETY FILMS SHOW MEN HOW**

The foreman's key position in the plant safety program is the theme of two safety films released by the National Safety Council.

"Pick Your Safety Target," an all-color cartoon film based on actual accident-reduction plans within industry, features a foreman beset with an accident-ridden department. The film sets forth a three-step plan for detecting accident causes and taking corrective action.

The second film, "A Gray Day for O'Grady," employs a series of comedy situations to dramatize the high cost of accidents.

Both of these Sarra-produced films were prepared under the supervision of Charles Alexander, manager of the industrial department of the National Safety Council, and Glen Griffin, the Council's director of industrial training.

"A Gray Day for O'Grady" is available in 35mm sound slidefilm (b & w) and 16mm sound motion picture (b & w). "Pick Your Safety Target," filmed in stop-motion cartoons, is available in 35mm sound slide (color) and 16mm sound motion picture (color and b & w).

For additional information and prices, write the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill.

### **Safety Training**

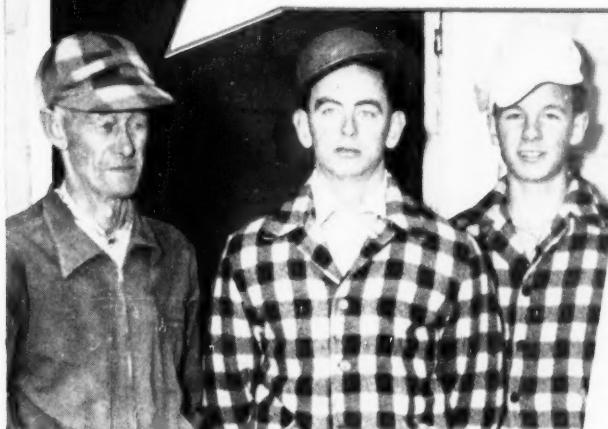
(Continued from page 44)  
apply to the professional safety man.

Next advanced course on "Safety Management Techniques" will be given April 13-17. In addition to the February meeting, the basic course will be offered March 9-13, May 11-15, June 8-12, November 9-13 and December 7-11.

A company or organization need not be a member of the Council in order to enroll a representative. Further information may be obtained by writing the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill.

# "10-10-10 fertilizer more than doubled pasture production"

says Henry M. Berg, Blanchardville, Wis.



Mr. Berg is shown here on his farm with two of his three sons, Robert (center) and Duane (right).

With results like this, it's easy to see why Henry M. Berg of Blanchardville, Wis., calls his use of 10-10-10 complete fertilizer on pastures "the best investment we ever made."

In 1951, Mr. Berg and his sons applied 10-10-10 to his pastures at the rate of 560 pounds per acre and fenced off a portion as a test plot. The yield per acre on this fertilized plot was 8,025 pounds against 3,750 pounds of dry matter on unfertilized fields. The unfenced portion, used for pasture, furnished fresh grass for cattle all summer long.

In 1952, 250 pounds of 10-10-10 were used and the results were approximately the same.

## Bigger yields for farmers mean better business for you

● Pastures are only one place where application of high-nitrogen complete fertilizers pays off. Corn, small grains, orchards and many other crops respond with equally impressive yields.

As more and more farmers discover how profitable an investment in high-nitrogen fertilizers can be, demand for them will go up and up. Meet this demand among your customers with the finest high-nitrogen fertilizers you can mix, and that means fertilizers that get a major share of their nitrogen content

from U·S·S Ammonium Sulphate.

Dry, free-running U·S·S Ammonium Sulphate gives equally outstanding performance in mixing and in use. Since its nitrogen is in the ammonia form, it won't leach out during spring rains, yet converts to readily available form in the warm, moist growing season.

For complete information on U·S·S Ammonium Sulphate, contact our nearest Coal Chemical sales office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

## U·S·S AMMONIUM SULPHATE



UNITED STATES STEEL

3-89

## Random Notes and Quotes

(Continued from page 19)

DuPont, which has its own sodium polyacrylate soil conditioner, has joined those licensed to make a conditioner under the Monsanto patents.

In the days of the wild and wooly West, the revolver was the great equalizer. Now, says Coke Oven Ammonia Research Bureau's "News and Views" fertilizer is the equalizer of land as the six-gun was the equalizer of men.

Soil conservationist for Saginaw, Michigan, an authority on how to keep topsoil from washing away, came home from vacation recently to find heavy rains had washed out the cinder surface of his driveway.

Jefferson County, Missouri, in the period between January 1 and June 30, 1952, has undergone a striking shift from low to high analysis fertilizer . . . from 4-12-6 to 8-24-8. Local agronomists have not said what caused the light to dawn, but dawn it has.

At Yukon, Oklahoma, one Howard Wood told the Lions Club about his new business, a worm farm which since last May has grown 100,000 worms. But until a year from next Summer, when he hopes to have a million of 'em, he'll not sell. Becomes attached to the little things, no doubt. Beware this competition, gentlemen of the Fertilizer Industry . . . one worm will produce 1500 at a single hatching!

From Lonoke, Arkansas, comes word that farmers are killing plants with fertilizers . . . be calm . . . undesirable plant life at the bottom of a lake!

Out in Kansas they are using a treatment that "works just like a frost" on their alfalfa seed fields. They spray on two pints of dinitro with four to eight gallons of diesel oil per acre; the alfalfa dries out, and the seeds can be threshed out standing, like wheat.

In Italy, working with Marshall Aid Plan funds, they are using volcanic dust with the new fertilizer being produced.

Dr. Charles Wilson, botany professor at the University of Georgia has, after 13 years completed an apparatus which measures photo-synthesis—which will permit accurate and quick selection of types of plants for types of soils, automatically and on a large scale, without waiting for it to grow on test plots.

Eight conclusions have resulted from an experiment which has been underway for two decades, with alterations.

The research, conducted by the Virginia Agricultural Experiment Station was aimed at finding, among other things, the influence of farm manure, nitrogen phosphate and potash used alone and in various combinations on the yields of corn, wheat and two years of hay in a four-year rotation.

The eight conclusions reached in the experiment are:

1—Manure applied once in four years is as good as annual applications when the total amount applied in the rotation is the same.

2—Farm manure alone, farm manure and phosphate, a combination of phosphate and potash, or a combination of nitrogen, phosphate and potash resulted in substantial increases in yield over check plots or plots receiving unbalanced fertilizers.

3—Phosphate is the first fertilizer nutrient which becomes limiting to corn yields. Later potash becomes limiting.

4—Stands of clover are difficult to establish and maintain where either phosphate or potash have not been applied.

5—Superphosphate is superior to rock phosphate when used in amounts to supply the same total p-2 O-5 on a soil with a pH between 6.5 and 7.0.

6—In the residual study, yields of corn and wheat were maintained for four years after fertiliza-

tion was discontinued. Then they began to decline. Yields of hay begin to decline almost immediately.

Out in the state of Washington they help fir trees to grow by spraying the whole area with 2,4-D and 2,4,5-T in various combinations, sprayed on by hot airplanes for 25-foot heights. The broadleaf trees and brush are killed. The fir's oily needles are not harmed.

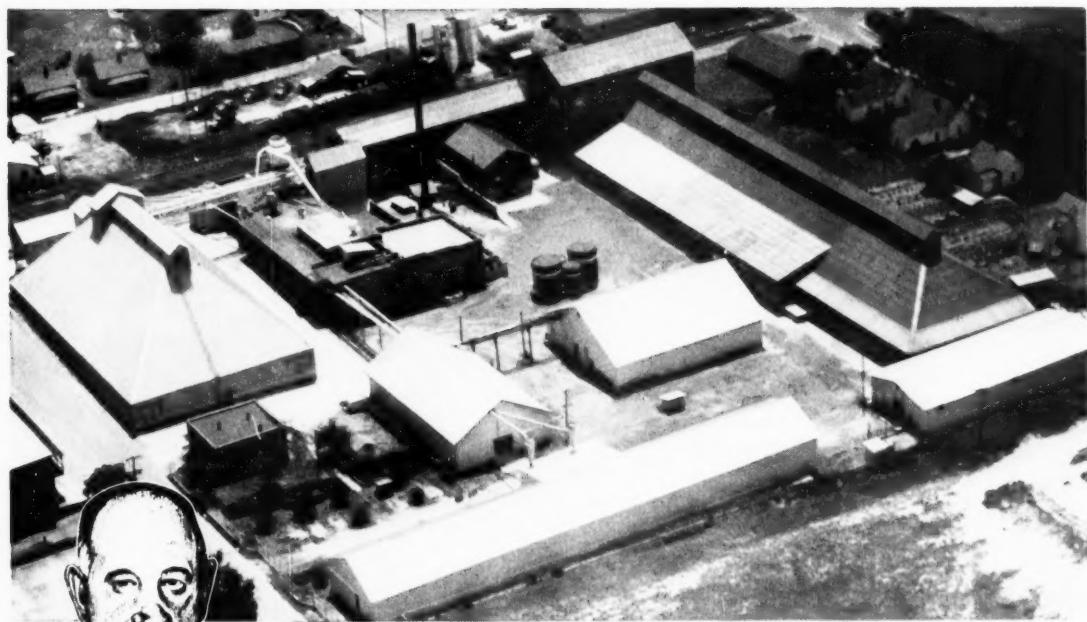
A bulletin from the National Cotton Council says "boll weevils are snatching the sheets" . . . this to help promote the cotton belt insect control conference they are sponsoring this month.

The University of Nebraska boys are predicting spraying of liquid fertilizer from airplanes, soon.

Henry B. DuPont, in a recent speech, said that fear of modern technology and misunderstanding of its productive role underlie much of the world's current uneasiness.

Phosphate seems to have a new use—to prolong the effective life of DDT. H. Maes, of the Belgian Congo, found out that DDT rapidly lost effectiveness when sprayed on native huts . . . blamed aluminum and ferric iron which dehydrochlorinate the DDT. Phosphate as an undercoat prevents that reaction.

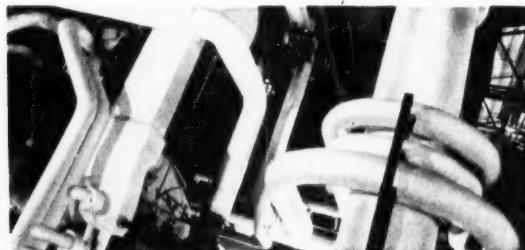
As sulphur becomes more plentiful, the use of nitric will still gain via the TVA process, TVA says, because a producer with captive ammonia or nitric acid facilities can make the cheapest phosphate fertilizers in the world. And when you add up the recent developments, the total is impressive. We have reported these as they were announced, but look at this list all in one place: Nitrogen Division's \$6,000,000 South Point plant; Northern Chemical's 70-tonns-a-day Sandy Point plant; Associated Cooperatives' 60,000 annual ton unit at Sheffield; Methieson with Chemeo operating a pilot plant for them . . . not to mention the many plants abroad using the process.



**Bob Barnett** has been a SCOCO employee over a quarter century; plant manager since 1936.

**This air view shows** the new plant of one of the oldest fertilizer companies in the Carolinas, Southern Cotton Oil Company of Shelby, N. C. Founded in 1902, SCOCO has served the farmers of Western North Carolina for over half a century.

## **SCOCO High Quality Fertilizer** **... Another Spensol User**



**From plants like this**, Spensol (Spencer Nitrogen Solutions) is shipped direct to America's leading mixers. Dependable service has made Spensol a favorite ammonia solution coast-to-coast.



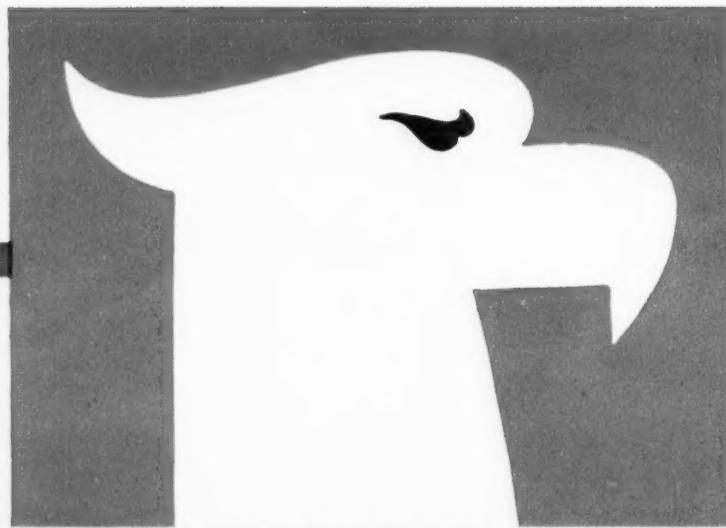
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# Mostly Personal

**True D. Morse**, president of **Doane Agricultural Service, Inc.** has been named **Undersecretary of Agriculture**. He helped write the Republican Platform farm plank.

\* \* \*

**Charles E. Wilson**, former president of **General Electric**, has been made chairman of the executive committee of **W. R. Grace & Co.** with whom he has been associated as director and consultant since 1952. **W. P. Gage** has become president and a director of **Grace Chemical Company**, which is building a \$20,000,000 nitrogen plant near Memphis. He joined Shell Oil in 1929 and had been their manufacturing vice-president since 1941.

\* \* \*

**J. L. Mealy** has been made sales manager, direct application, rock phosphates by **International Minerals & Chemical**. He was formerly sales manager of their **Thomson Phosphate** department. He has also assumed the responsibilities, in connection with sales, of **Miss M. C. Boyle**, one of the founders of Thomson Phosphate Company, who will retire March 31. She was president of the concern for more than 10 years. **H. R. Haiden** has been made assistant to Mr. Mealy.

\* \* \*

**William P. Gatts** has joined the Los Angeles organization of **Fulton Bag & Cotton Mills**. He has had nineteen years of experience in the bag business.

\* \* \*

**J. Donald Mochi** has been made sales representative in the Northeast for **Pittsburgh Agricultural Chemical Company**. He has been assistant to **Dr. J. B. Skaptason**.

\* \* \*

**Robert J. Stevens** has been appointed sales manager of the multiwall division of the Chase Bag Company. **R. N. Conners**, Vice Presi-

dent, announced recently. Mr. Stevens has been associated with the Chase Organization since 1945. **G. N. Burns**, formerly in the Chicago general sales office, has been transferred to New Orleans as regional sales manager of the multiwall division.

\* \* \*

**Lawrence K. Norton**, who came to **Gilman Paper Company** from the **Minnesota Mining & Manufacturing Co.** has been designated as Assistant to **Harry C. Lawless**, vice president and director of sales for Gilman Paper Company, with headquarters at 630 Fifth Avenue, New York. In addition to his new duties, Mr. Norton heads the sales department of **The Cellucord Corporation**, a Gilman Paper Company subsidiary. Prior to handling Cellucord sales, he represented the **Kraft Bag Corporation**, another Gilman subsidiary, in the Southwestern territory.

\* \* \*

**C. T. Prindeville**, vice president of **Swift & Company**, was elected director of the company at the annual meeting of shareholders January 15. Mr. Prindeville has had a wide background of experience with Swift. He joined them in 1921, as a cattle driver, later served as a weight taker and a time study man. Subsequent assignments included association with oil mill and vegetable oil refinery operations. In 1941, Mr. Prindeville was elected vice president. Presently he is in charge of plant food, oil mill, livestock and poultry feed operations.

\* \* \*

**Howard C. Peterson, Jr.** is now district manager of the Southwestern sales district of the multiwall bag division, **St. Regis Paper**. In this position he succeeds **H. S. Rhodes**, who has been appointed general manager of the field engineering department of the company's engineering and

machine division. Mr. Rhodes succeeds **H. S. Hangen**, who has been named assistant general manager of the engineering and machine division. Mr. Hangen will continue to make his headquarters in the New York office.

**B. W. Peake** continues as manager of field engineering in the Birmingham area.

Mr. Peterson, who has been on the general sales staff of the multiwall bag division, will make his headquarters at the Birmingham office while Mr. Rhodes' headquarters will be in the new engineering and machine division plant of the company at East Providence, R. I., which is expected to be ready for occupancy by May 1 next.

\* \* \*

The **Consolidated Mining and Smelting Company** of Canada Limited recently announced the following staff changes. **A. Olaf Wolff** has been appointed to the newly created position of administrative assistant at the company's head office in Montreal, Quebec. **R. Erin McAllister**, formerly Western sales manager of the chemical and fertilizer sales division at Vancouver, B. C., has been appointed assistant manager of the division succeeding Mr. Wolff. **K. T. Seaborne**, formerly Prairie sales manager of the same division, has been appointed Mr. McAllister's successor at Vancouver.

\* \* \*

**George E. Silvera** has become associated with **Larvacide Products, Inc.** in connection with the promotion of sales of Larvacide for soil fumigation, methyl bromide and its compounds. He will work out of the Larvacide Products New York office.

\* \* \*

**L. Gordon Slutz**, vice-president, The Ridgefield National Bank, Ridgefield, N. J., has become vice-president of Nitrogen Products, Inc., **Chester S. Edwards**, president, announced.

Nitrogen Products, Inc., New York, is sales agent for coke oven producers handling such major products as ammonium sulfate, benzol, toluol and xylol.

**Paul T. Truitt**, president of the **American Plant Food Council**, was a speaker at the Minneapolis conference January 29 of the Barley Improvement group.

\*\*\*  
**Wm. J. E. Francis** has been appointed general sales manager, Western, of **American Potash & Chemical Corp.** Mr. Francis succeeds **David B. Scott**, who has retired after 18 years in charge of the company's Western sales office in Los Angeles.

\*\*\*  
Recent Ashcraft-Wilkinson promotions announced are: **John E. Foy, Jr.**, of Tampa, Fla., to vice-president; **Walter J. Fargason**, of Atlanta, to secretary and treasurer, and **W. Mercer Rowe, Jr.** of Atlanta, to assistant vice-president. Mr. Rowe will be in charge of Ashcraft-Wilkinson's Pesticide Division.

\*\*\*  
**J. Van Rogers, Jr.**, formerly with National Cottonseed Products Assn. is now with **Southwest Potash** with headquarters in Little Rock, Ark. He will travel the Southwest territory.

\*\*\*  
**J. H. Epting**, **Epting Distributing Company**, Columbia, S. C. was made president of the Southern Seedsmen's Association at their recent Miami convention.

\*\*\*  
**Malcom Rowe**, **Rowe Fertilizer Company**, Athens, Georgia, has dropped the reins of the **Georgia Plant Food Educational Society**, only to take up those of the **Athens Chamber of Commerce**.

\*\*\*  
**John J. Porter** as assistant to the executive vice president, and **Malcolm E. Hunter** as assistant director of sales are announcements by the **Nitrogen Division**, Allied Chemical and Dye Corporation.

Mr. Porter was formerly assistant director of sales, the position that Mr. Hunter now moves into. Mr. Hunter has been sales manager of direct application fertilizer materials for the Division.

\*\*\*  
**John J. Harte**, president **John J. Harte Co.**, engineers, Atlanta, Georgia, has been elected an associate member of the American Institute of Management.

\*\*\*  
**Dr. J. E. Johnson** holds the new post of director of agricultural chemical research, **Dow Chemical Company**. He has been assistant director of the biochemical research department. In his new capacity he will report directly to **J. W. Britton**, agricultural chemicals department manager, and will be responsible for carrying out the agricultural chemical research program, including activities at four Dow laboratories.

\*\*\*  
**R. R. Worthington** has become assistant sales manager, Bagpak division, **International Paper Company**. **R. I. LaMarche**, sales manager has announced. **O. W. McDuffie** will take Mr. Worthington's place as sales manager of the machinery sales and service department of the Bagpak division.

\*\*\*  
**Bernhard G. Schneider** holds the newly created post of assistant chief engineer, conveyor equipment section of **Chain Belt Company's** conveyor and process equipment division. He joined them in 1926 as an engineering apprentice.

William E. Merritt who has joined the staff of **H. J. Baker & Bro.** New York. He has been with Chilean Nitrate and more recently with Ashcraft-Wilkinson.

## DEATH TAKES ASHCRAFT



Lee Ashcraft

**Lee Ashcraft**, 82, co-founder with the late **Mell Wilkinson** in 1912 of Ashcraft-Wilkinson Co., Atlanta, of which he was chairman of the executive committee at the time of his death, January 26 in Atlanta after a long illness.

**Mrs. Louise Ormsby Trueman**, wife of Ray B. Trueman, Trueman Fertilizer Company, Jacksonville, of a heart attack suffered at her home in Jacksonville, December 24.

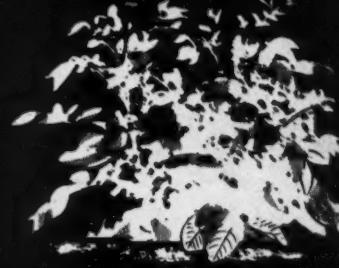
Robert C. Simms who has become executive vice-president of Thurston Chemical Company, whom he joined in 1951 as assistant to president William R. Thurston, after resigning as president of Naco.



Wm. E. Merritt



Robt. C. Simms



magnesium  
aids in the production  
and transport of carbohydrates  
and proteins!

### Include Soluble Magnesium in Your Quality Fertilizers

**Sul-Po-Mag®**  
Water-Soluble  
Double Sulfate of Potash-Magnesia

Magnesium is the basic metallic element in chlorophyll, the green plant substance which captures the sun's energy that is vital for life and growth.

Magnesium concentrates in the seed with phosphorus to aid in the formation of oils and proteins required for viable seed.

Magnesium functions as a carrier of phosphates to the actively growing and fruiting parts of the plant.

★ Magnesium is required to activate the processes which stimulate the production and transport of carbohydrates and proteins within the growing plant.

Magnesium, in sufficient quantities, enables the plant to utilize other plant nutrients for healthy, disease-resistant growth.

Magnesium stimulates the growth of soil bacteria and increases the nitrogen-fixing power of legumes.

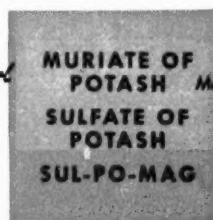
Growing plants have a complex system in their leaves for producing valuable proteins, sugars and starches. The "machinery" of this system is a series of enzymes. Many of them require magnesium for efficient operations in the growth process. If there is a deficiency of magnesium, the machinery for the production of carbohydrates and proteins slows or stops and the plant starves. Magnesium also aids in the transfer of the starches produced in the plant leaves to the storage organs in stems or roots. This is one reason why storage crops such as beets, onions and potatoes require substantial amounts of magnesium.

Citrus, cotton, grains, legumes, vegetables and many other crops also require soluble magnesium for healthy growth. Where soils are deficient in magnesium, this essential nutrient can be supplied most effectively and economically in soluble form by including Sul-Po-Mag in mixed fertilizers. Produced exclusively by International, Sul-Po-Mag provides a balanced ratio of sulfate of magnesium and sulfate of potash. Both are water soluble and immediately available to crops.

International is stimulating interest of Sul-Po-Mag among farmers by national advertising in leading farm publications. You can capitalize on this advertising by using Sul-Po-Mag in the complete plant foods you mix for crops grown on magnesium-deficient soils. Sul-Po-Mag is bagged for direct application and supplied in bulk for quality mixed fertilizers.



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# *In the field of* **PESTICIDES**

## **FTC-USDA PLAN CONFERENCE ON CODE FOR SOIL CONDITIONER ADS**

Mighty soon there should be established a definite code for the advertising of soil conditioners, nearly 50 of which are now on the market, and which should reach \$15,000,000 of sales this coming season. The Federal Trade Commission is planning a trade practice conference, to be conducted by their bureau of industry cooperation, the time for which had not been set as we went to press.

In this connection, a bulletin on the subject from USDA is pertinent, and follows:

"Preliminary screening tests show a wide range of effectiveness in 28 products marketed as soil conditioners. In a round-up of recent information from Federal-State studies, Dr. R. Q. Parks, who is head of the Division of Soil Management and Irrigation Agriculture, Bureau of Plant Industry, Soils, and Agricultural Engineering, reports:

"Short-terms evaluation tests confirm preliminary findings that the best of the conditioners are highly effective agents in stabilizing whatever structure of soil has been prepared. They hold unusual promise in certain soils for preventing soil crusting and for erosion control. In studies at the U. S. Salinity Laboratory at Riverside, Calif., some of the compounds have shown a marked influence in improving both non-saline-alkali and saline-alkali soils under irrigation.

"Dr. Parks underscores the point that the usefulness of the new compounds is in stabilizing whatever soil structure is prepared. For best results they should be applied to a well-prepared seedbed. The soil should then be thoroughly mixed, and stirred again after a rain or an

irrigation. Spraying a solution of soil conditioner on a heavy baked clay without cultivation cannot be expected to improve soil structure.

"Active ingredients in the materials tested fall into five groups of chemical compounds: Polyvinylites, polyacrylates, cellulose derivatives, lignin derivatives, and silicates. Although preliminary ratings indicate considerable differences in the effectiveness of the compounds, definite ratings cannot be made until these are tested on more soils, under many diverse conditions, and over a greater period of time.

"The screening tests with a number of materials reveal a wide range—from 15 to 98 percent—in the amount of active ingredient used in the different commercial compounds. There is considerable variation in the cost of materials needed to treat 100 square feet of the plow layer of soil—from 50 cents to \$7.90. Per acre costs would range from \$200 to \$3,000 at rates recommended by the manufacturers for the various compounds.

"In exploring ways to use the more effective compounds in agriculture, the scientists note that seed germination and rooting have been enhanced in certain soils when compounds were mixed with the soil to a depth of 4 to 6 inches. One of the big problems for research is to determine the best tillage equipment for this job.

"Tracer tests in which radioactive phosphorus was combined with conditioners have indicated that the disk and harrow do not distribute the material evenly throughout the plow depth. In experimental cotton rows, treatment of a soil band only 4 inches wide permitted maximum

benefits in the immediate area of the plants and required only 1/10th of the material that would have been needed to treat the entire row. Preliminary tests indicate that a shallow application to the top 1/2 to 1 inch of soil will be sufficient to prevent crusting on soils where the seed of small-seeded grasses and legumes are broadcast.

"Dr. Parks says users should keep in mind that the compounds are not fertilizers. They will not permanently affect the nutrient supplying capacity of the soil. The findings show they cannot increase the water-holding capacity of most agricultural soils.

"Among many questions still to be answered are how long the compounds will persist in the soil and how soon the soil would need another treatment. Early experiments indicate that products in which the polyacrylates are the active ingredient are quite resistant to bacterial attack."

### **Monsanto Granted Conditioner Patents**

Two United States patents pertaining to synthetic organic chemical soil conditioners have been issued to Monsanto Chemical Company, Vice President John L. Gillis, general manager of the Organic Chemicals Division, disclosed today.

The first of these, U. S. Patent No. 2,625,529, pertains to the use of a large and diversified class of synthetic organic polyelectrolytes as soil conditioners, including Monsanto's Krilium soil conditioners.

The other patent, U. S. No. 2,625,471, pertains to plant fertilizing compositions containing plant nutrients and certain synthetic organic polyelectrolytes.

### **Pesticides Seen Vital for Health**

Millions of people now are being saved each year from death or serious illness because of chemical insecticides and repellents, whereas deaths caused by these chemical products are almost unknown, Dr. Edward F. Knipling of the Agricul-

**D-K CO.**

**Engineers A New Step In Fertilizer Batch Mixing**

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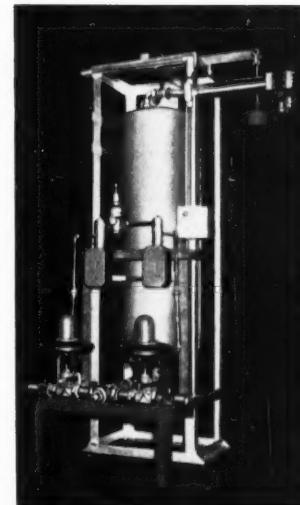
Add ammonia or nitrogen solution in the mixer automatically—Push Button Control.

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- KEEP ACCURATE BATCHING RECORDS —**

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tural Research Administration, USDA, stated December 15.

Speaking in Philadelphia before the American Association of Economic Entomologists, of which he is president, Dr. Knippling contended that the life-saving value of insecticides that may be potentially hazardous if used carelessly, should be considered when determining whether they should or should not be recommended for use.

#### **Vegetable Growers See Color Film On Treatment Of Plant Diseases**

Diseases of fruit and vegetables whose ravages are reflected in the retail price of every apple, potato, bag of spinach or snap beans, may soon be prevented with minute amounts of terramycin, penicillin and other antibiotics.

A color motion picture film of the first successful treatment of diseased plants with the "miracle drugs" was shown recently before the Maryland Vegetable Growers Association annual meeting in the Lord Baltimore Hotel.

The film is a record of experimental work done at the Beltsville station of the U.S. Department of Agriculture and at state experiment stations. It was produced by Frederick C. Visor, head of the Industrial Antibiotic Section, Technical Service Department of Chas. Pfizer & Co., Inc., world's largest producer of antibiotics.

Concentrations as low as a few parts antibiotic to a million parts water had the effect of controlling ring rot of potatoes, halo blight of snap beans and bacterial rot of spinach. Somewhat higher concentrations successfully checked the fire blight disease of pear and apple trees. This disease has spread unchecked for more than 100 years, wiping out the pear growing industry east of the Mississippi and causing severe economic losses to apple growers.

Mr. Visor pointed out that much of the work was done by Dr. John W. Mitchell and Dr. William J. Zaumeyer of the USDA Bureau of Plant Industry. Mitchell and Zaumeyer discovered that streptomycin

and other antibiotics, when applied to the outer surfaces of stems worked into the tissue and spread upward through the circulatory system of the plant. This opened the possibility of preventing certain fruit tree diseases with a "shot" of antibiotic in contrast to the customary method of frequent spraying and dusting.

#### **Prerequisites for Pesticides Proposed**

Procedures for evaluating pesticides, prior to marketing, have been proposed by the Food Protection Committee of the National Research Council, Washington, D. C. The report was titled "Basic Considerations In The Development and Marketing of New Agricultural Pesticides Intended For Use in Connection With Food Production."

The report stated that the introduction of new pesticides for use on food crops and livestock is a matter of public concern and that sound policies must be observed in the evaluation of new pesticides.

Referring to the necessity for these compounds, the Committee reported that "These new materials would not be introduced and could not survive if they did not serve a useful purpose and improve our food supply. Since they are needed, every effort should be made to encourage the research necessary for their development and to assure their use as soon as they can be introduced without jeopardizing the food supply or the health of the consumer."

The Committee has made these proposals, according to the report, to serve as "both practical and adequate requirements for the pre-marketing evaluation of a new agricultural pesticide."

The report pointed out that "before any new pesticide is marketed, its performance and safety, when used in the proposed manner for the specified purpose, should be clearly established. The chemical and physical properties and the function of the proposed pesticide, its toxicology, both acute and chronic, and time and method of application will determine the amount of

information required to establish adequately its performance and relative safety. Data on important points should be of such nature and magnitude as to be reasonably conclusive, and/or to permit statistical evaluation."

#### **Research Potent To Prevent Depression**

The enormous expansion in America's research effort, which now totals \$3 billion a year, constitutes a potent counter force to any possible future economic depression, Dr. M. K. Horne, Jr., economist of the National Cotton Council told a meeting of the Council's Board of Directors in Memphis recently. Dr. Horne said "The nation's research programs, most of which are directed to civilian markets, are aimed at making new and better things in new and cheaper ways. They are designed to generate new demands for products. In fact, these research efforts are so vast that they have a good chance of remaking the future buying habits of the American people."

"Our economy today" he said "is sustained by the prospect of strong, dynamic demands over into the future. If we avoid another big war, these potential demands are the real force that can see us through any future recession, holding such a recession to moderate and corrective proportions, and bringing us out on the other side into a new era of growth and progress."

#### **CFA To Hold Two Meetings a Year**

California Fertilizer Association has decided that, in addition to the regular conventions, an annual fertilizer conference will be held, sponsored by their Soil Improvement Committee, at a different time and possibly place. The findings of technical workers, they feel, has grown to sufficient interest to warrant an entirely separate meeting, at which full attention can be concentrated on these matters. The conventions will be devoted, hereafter, exclusively to business sessions, the Bureau of Chemistry session and recreation.

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## Monsanto Develops New Water-Soluble Fertilizer

A water-soluble fertilizer which has been formulated to minimize risk of leaf or grass burn has been developed by Monsanto Chemical Company, Roy L. Brandenburger, general manager of the company's Merchandising Division, announced January 13.

The new product, called Folium, is now being manufactured and will be offered to the public in mid-February through distributors and dealers currently handling products of Monsanto's Merchandising Division, Brandenburger said. Products previously offered by Monsanto through national retail channels include Krilium soil conditioner and Rez surface coatings.

Folium is a quickly-soluble inorganic fertilizer of 20-20-20 composition (20 per cent nitrogen, 20 per cent phosphorus, 20 per cent potash). It contains a chemical which keeps the product in free-flowing,



These were two of the tomato plants used in the thorough tests which preceded the marketing of Folium, Monsanto Chemical Company's new water-soluble fertilizer. Soil scientists sprayed the plant at the right with the standard Folium solution. Both plants are the same age and were the same size when Folium feeding began.

Tests with radioactive tracers have shown that the plant food available in water-soluble fertilizers is absorbed by plant leaves within 30 minutes to two hours after the fertilizer is applied.

In the home garden field the new fertilizer may be sprayed or sprinkled on grass, flowers, vege-

tables, shrubs and trees by use of a garden hose coupled with a siphoning device. It also may be used with any one of several commercially available spray applicators or an ordinary sprinkling can.

Additionally, Folium is expected to have wide usage in greenhouse and nursery operations because of the increased efficiency and economy of water-soluble fertilizers in these fields.



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**Ammoniated Base and Superphosphate**

**Dolomitic Lime**

(42-44% Magnesium Carbonate)

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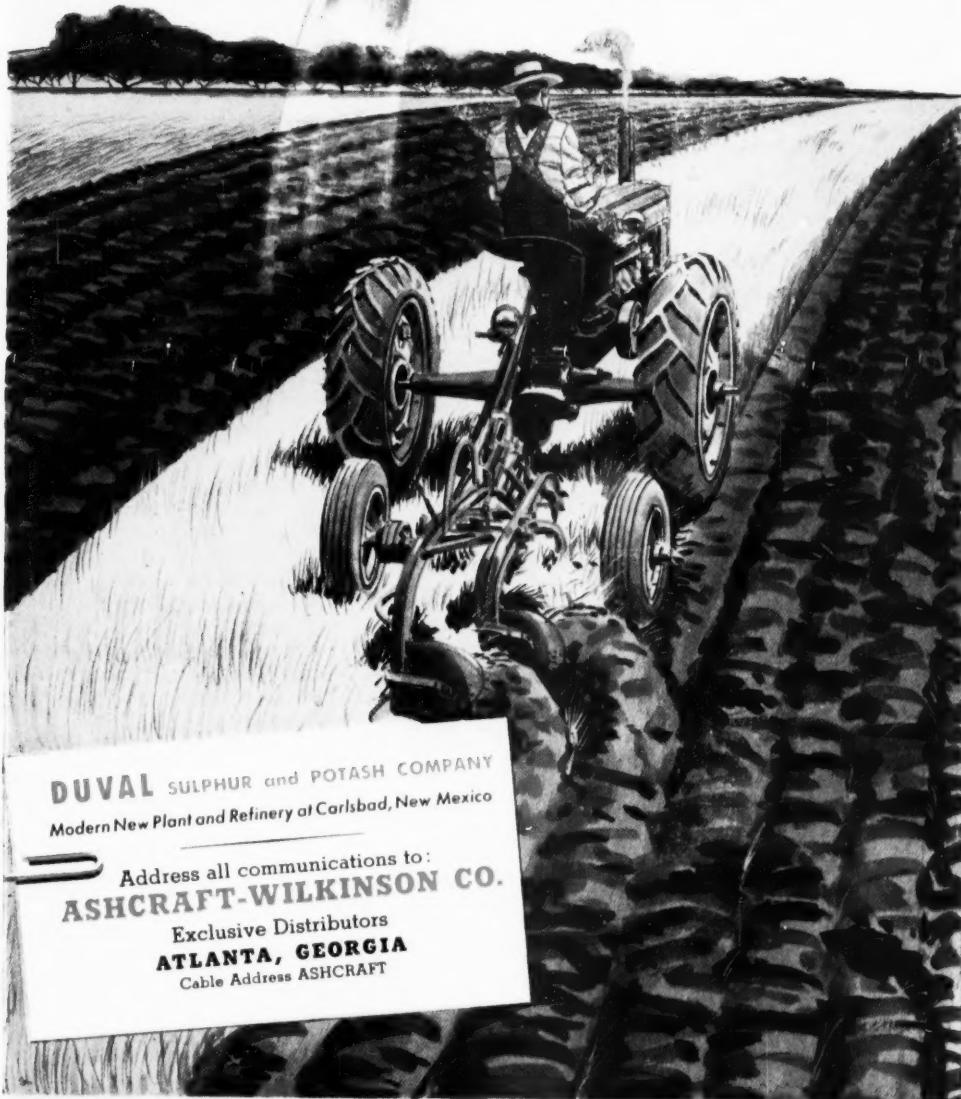
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## Rutland

(Continued from page 22)

genous compounds and granulation. They will be in the direction of lower per unit production costs of the major components, through large concentrations and more efficient mechanical devices, which will permit wider areas of distribution. High concentrates will aggravate the problems of reactions and stable conditioning, which have not yet been mastered, but I believe soon will be. Also, the super-refining of the elemental materials will accentuate the need for micro-nutrients, which will become more a part of required formulation, even as the polished rice, double bolted flour, and highly refined sugar, catering to the more civilized palate, has caused the high incidence of vitamin pills in the human diet. I feel confident that our scientific friends in agriculture will not only keep abreast of this development, but will likely be out in front pointing the way, in adapting cultivation methods to these newer concentrates.

I think you will naturally draw the conclusion that the opinion I have just expressed indicates a trend toward large plant concentration, and away from small localized units. I think it does with regard to production, because the products of the future do not lend themselves to small plant operation. The introduction of concentrates as 12-12-12 and 15-15-15, and the entrance into the

industry by Allied Chemical, with a 200,000 ton plant, W. R. Grace and Company, and the large Petroleum concerns, certainly raises a question of what will the impact be upon our present production and distribution systems, and is something which we cannot afford to ignore. I don't want to create the impression upon my smaller friends that what I say threatens their existence, however. There should be a place for all of us somewhere in the program of the future, if we plan intelligently to integrate.

I have taken considerable time to emphasize the progress in two sides of our triangle, the production of product volume and the educational promotion of usage need, for the particular purpose of comparison with the third side, that of building the technology of distribution to the level of the other two. In that field, gentlemen, I do not consider that we have any reason to feel complacent. I have used the term "distribution", rather than just selling, in its broader sense as embracing all of the associated functions of management, educational promotion and advertising, service and sales.

Having been in the industry for 40 years, all of which was associated with distribution, and to a small degree in an administrative capacity, nothing I say could be directed at anyone more than myself. I picture our development in sales efficiency as trying to run a race with high-

powered efficient machines of 1953 model productions, in a T model vehicle geared to a speed of the teens and the twenties. Unless we build our distribution systems to the strength of the other two sides, our triangle collapses from inability to carry the weight. No matter how effectively we create demand, or how fully we perfect production, they are without purpose unless distribution builds the highway between. Sales carries production to the market, to fill the need and produce the **profit** which is essential to continued growth.

I feel so strongly about this subject, and consider it so vital an excuse for my own being, if I really got started I could talk the remainder of the meeting, as a good Episcopalian, about all those things we've done that we ought not to have done, and those things we ought to do, and haven't. All of you know these as well, or better than I do. So I shall confine it to a few high points which I think are primary to any improvement in our system of sales distribution.

I don't propose to belabor you with a long recital of the many ingenious devices our fertile minds have worked out during the past, which conditions of recent years have permitted to lie dormant, conceived for the purpose of avoiding sound merchandising principles. We are all too well acquainted with them. Every single one of these practices serves the same purpose, either directly or indirectly, to lower the standard of value of our product, and to convince the customer it wasn't worth what we asked for it in the first place. We rationalize to ourselves by claiming we are "forced" to do this or that because some other fellow is doing it. Doesn't that answer, in a great many instances anyhow, beggar the question?

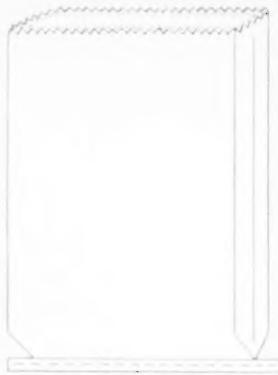
I do propose, however, to refuse to accept mentally the idea that there isn't anything we can do about it. Because it always has been done that way—so be it. I submit further, that only one ingredient is essential, a sincere desire to eliminate unsound practices and an honest and courage-

St. Louis Girl Scouts and Brownies made these toys from cotton dressprint bags. Bemis Bro. Bag Co. sent us the photograph, which was made during a Gift Festival to which 12,000 girls came bringing toys for less fortunate children.



### SEWN OPEN MOUTH

After the bag is filled, it is closed by sewing, stapling, wire tying, gluing or by using wide gummed tape. The bottom closure is made in the V-C bag factory.



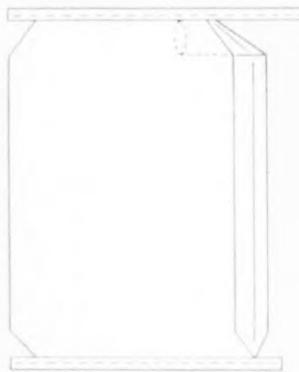
### SEWN VALVE

Bag is filled through a small opening or valve at the top. When the bag is full, the valve closes automatically. Recommended for coarse, bulky products.



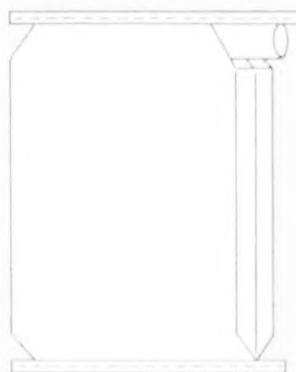
### SEWN VALVE WITH SLEEVE

Similar to sewn valve type except that the valve has an extended inner sleeve. This eliminates sifting of finely-ground, dusty materials.



### SEWN VALVE WITH TUCK-IN SLEEVE

After the bag is filled, the sleeve is manually folded into the valve pocket under the sleeve, thus forming a secure closure.



# Which V-C Multiwall Bag is Best for You?

Packaging is easier and more economical when you use the right type of multiwall bag. Each type has advantages for special kinds of jobs. If you have not reviewed your packaging requirements lately, it will pay you to consult a specially-trained V-C representative. Without cost or obligation, he will make recommendations that may save you money.

V-C Multiwall Bags are made of top-quality materials, carefully constructed to stand rough, tough treatment. In addition, V-C is prepared to make suggestions on how to modernize your trade design to give it extra sales appeal.

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**Multiwall**  
**Bags**

**2 TO 6 PLY**  
Plain or Printed  
in 1 to 4 Colors



Other V-C Products: Phosphate Rock Products • Complete Fertilizers • Chemicals • Cleaners • Textile Fibers • Pest Control Products

ous determination to do it. If we are ashamed to proclaim our own worth, who is there to speak for us in the market place?

The question of how can we, as an industry, overcome some of our problems and develop more rational methods of merchandising our products, is one which cannot be solved collectively, but is up to each single operator to determine for himself. There are several things that suggest a constructive approach to sound policies, which will mention in the order of importance as I consider them.

(1) **ADMINISTRATIVE:**—We start at the top and work down, because any correction of bad practices must originate in the thinking of the Big Boss, and be translated down the chain of administration. Unless the head of each concern determines the policies upon which his product will be marketed, adheres strictly to these principles as they apply to any particular condition, and insists that everyone in his organization does so, then some incompetent salesman at the least provocation will sell him on the necessity to "meet competition." The principle of sound management applies equally, I think, to the multi-million dollar outfit with a thousand salesmen, and the shirt-tail operator who sells it himself. It takes guts in the top as well as the bottom.

(2) **SALESMANSHIP:**—To implement this determination, a first step is the character of our representation in the field. Salesmen are the shock troops in every army of distribution. It isn't the cheapest salesman who pays the biggest dividends, but the most **economical** one. He requires knowledge of his business, ability to overcome obstacles, to rise above defeats and adapt to conditions, to be resolute in his policy with integrity under every circumstance, and to combine imagination and initiative with good judgment, as just some of the equipment necessary to represent his company to the customer. In order to obtain that type of representation, as an approach to improved selling methods, certain procedures have been found very successful in other industries.

(a) Employ only men who are capable of constructive development.

(b) Increase area coverage and responsibilities sufficient to utilize maximum abilities, and reduce the opportunity to hunt for troubles.

(c) Increase compensation level in line with bigger job requirement, and to attract the type salesman desired.

(d) Preferably through added incentive plans to scale total compensation to the individual performance, and afford the unusual salesman a corresponding reward with other industry standards.

(e) Sales Training Programs:—No matter how good the raw material is to start with, few salesmen will develop above the level of the direction given him. Practically all of the successful industries today include extensive Sales Training Courses as a part of their organizational development. This begins with the induction of the recruit, by a thorough grounding in knowledge of the concern and its products, essentials of their usage, the character and ethics under which they are required to conduct the business, and is continued throughout his career by refresher courses in more efficient techniques of selling as they are developed both within his own organization and from outside sources.

I think that considerable progress has been made during recent years in the direction of these objectives by some concerns in this industry, and that the level of representation generally is much improved today over what it once was.

There are in this industry today, as there are in others, a large number of people who have never really sold anything. During the past 10 or 12 years, we have taken what production has given us as a basis upon which to accept orders. Now, that word "accept" didn't used to be in the glossary of the fertilizer business. In 1921 and 22, and the early 30's, you didn't accept an order, you pulled it out by the roots. Some of us remember when we walked the streets day after day, hunting for an order for one carload. It took several days, and sometimes weeks,

to get a customer to buy a car of something he needed badly. I can't recapture, in the transactions of today, the thrill that came when the order was finally closed. Probably I had only \$15 or maybe \$25 in it, but that was really important money. It probably made the difference whether the family had meat that week, or not.

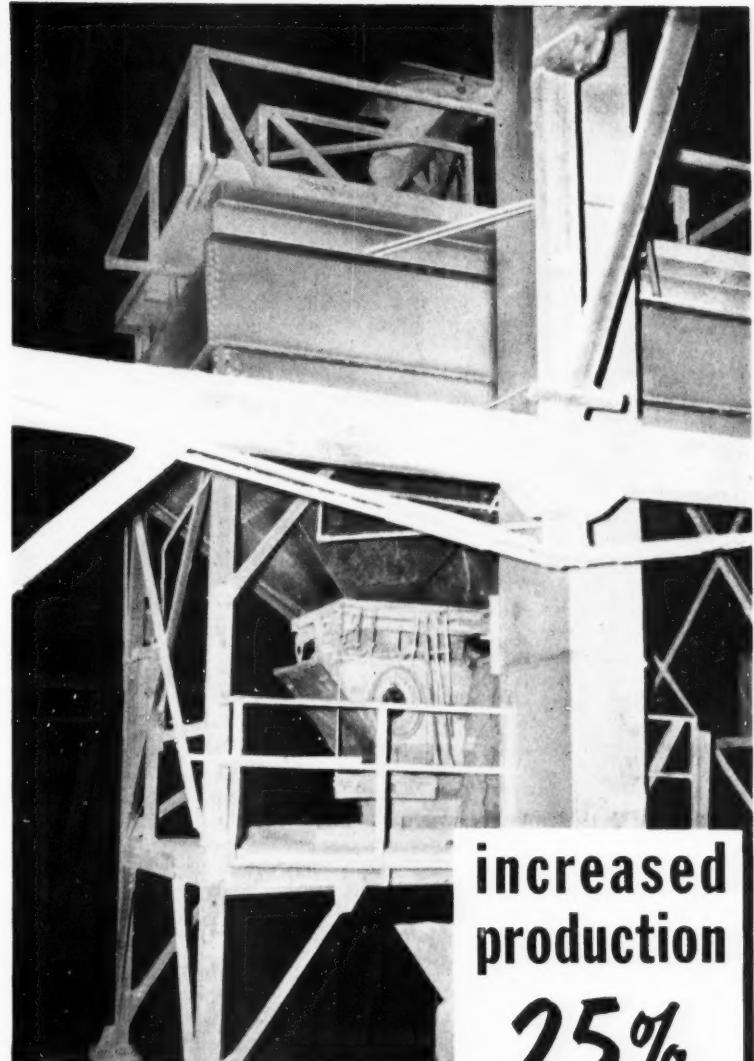
When discussing salesmanship, I like to illustrate with insurance. I use insurance because it has become one of the biggest businesses in the world, grown up from nothing within practically my own recollection, with nothing to go on but an idea with imagination. How many insurance men have you ever had ask you to cancel another company's policy, and give him one for the same amount? Usually the approach is to ask for the opportunity to study your insurance program, and probably suggest a valuable addition to your coverage. He hopes, of course, in that event he will get the business, but that isn't a part of the service rendered. Also, I've never had an insurance man suggest in the event his premium is a little higher than another's, he will adjust his to meet it. He is more apt to say, "Yes, their original cost is lower, and it's a good value for what you get. But with the study we have made, and the reserves we have for security, and the additional features our policy includes, we think you'll find it is more economical in the long run." Often it works. I know, for I have some of the highest priced there is. It isn't just that I'm a sucker. I was sold!

(3) **DEALER DEVELOPMENT:**—So much might be said on this subject. I hardly know how to develop the idea in a short space. Dealer relationship is, I think, the "heart" of our merchandising system, if it doesn't pump, the body dies. This phase of development is, perhaps, the one in which we have made the least progress, and therefore it affords the opportunity for the most improvement. Before much can be accomplished in this direction, however, our own development of salesmanship is prerequisite. The dealer is obviously not going to sell us, we've got to sell him.

It is dangerous to generalize on any subject. There are today many very fine dealers who are doing a much better job at their end than we are at ours. On the other hand, there are a high percentage of dealers whose operations are in direct conflict with our best interests, who are concerned only with breaking down values, making warehouse or hauling profits, or who use our products as a pawn to promote their own operations in other lines or merchandise. It is toward that kind of representation, (I am tempted to say misrepresentation) that my remarks are directed.

We talk a great deal about "selling" fertilizer. As a matter of fact, with the exception of very small local operators who deal directly with farmers, we don't really sell our product, we job it. Nothing is finally sold until it's consumed, the process up to that point is one of barter. The dealer who distributes our goods is the only medium of direct selling approach to the farmer, other than by advertising and promotional efforts, and these can be largely dissipated by a non-cooperative dealer. In the final analysis, he is the limiting factor in our merchandising success and, therefore, commands a major position in our selling organization.

What are some of the things which might contribute to a constructive representation. The dealer must be sold on the mutual advantages of a partnership, and an interest in supporting the advance of our policies. There must be sufficient compensation margin to make it worthwhile, and to create a sense of value in having the account. As a part of our selling organization, the dealer is actually a salesman at the retail level, and should be selected with the same discrimination used to employ salesmen. He should be made to feel that he is part of our organization, and included in the same programs of information, education and sales training patterned to the requirements of his field of operations. Regardless of how important a merchant may be in his locality, if he refuses to co-operate in your program, dictates the terms of do-

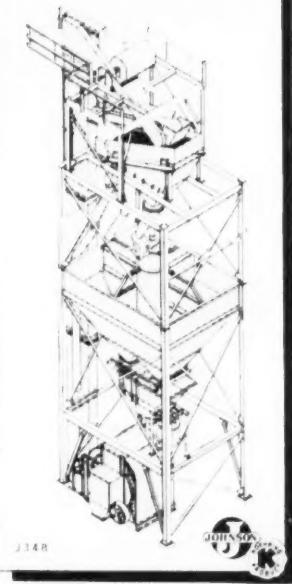


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production**

**25%**

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are successfully solving the problem of "more production — less cost" for many fertilizer manufacturers. One typical Johnson plant owner reports a production increase of 25% — and showed a substantial saving in manpower. As a result, this same fertilizer firm has modernized a second plant with Johnson elevator, bin and batching equipment. With this mechanical method, materials are elevated, pulverized, screened, weigh-batched and blended to exact specifications — all in one continuous cycle. Operation is fully-automatic or can be manually controlled. Check the savings possible in your plants. Whether you are interested in complete plants, or need auxiliary equipment, call your Johnson distributor, or write to us.



February, 1953

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J148



ing business with your product, holds back the sales instead of promoting them, and handles only the minimum necessary to keep you out of the territory, it will pay in the long run to get rid of him as you would an inferior salesman and find some more effective means of distribution.

Just one illustration of what I mean by salesman and dealer development. There are very few fertilizer salesmen who work all of their time, or who organize it much of the time. Suppose each salesman planned the use of his extra time, and programed it for Dealer Cooperation. Suppose he selected 10 of his dealers which offered the best possibilities for development, and spent that time working with the customers of those dealers. Not all the customers, but say 10 of the most promising. Not those customers who are using another concern's goods, but ones using his goods. Suppose he worked with those 10 dealers together with the 100 customers on their program of farm management, improved cultivation methods, and the economic benefit of more liberal fertilizer use. How many thousands of tons of NEW business do you suppose could be developed? And it would not create any competitive disturbance, either. It does presuppose two things, however, that you have salesmen trained up to that level, and dealers sincerely interested in promoting the sale of your product.

Gentlemen, I know of no other industry with greater possibilities for growth than the business of Plant Food. It is being practically thrown in our laps without having to be developed. What most businesses have to acquire by promotion, is being done for us by the agricultural scientists creating the demand, it is only necessary for us to have the imagination to grasp it. While we sit around and quibble over dead issues of the past, literally millions of tons of potential new business lies fallow in the field for development. The Department of Agriculture sets a figure of some 30,000,000 tons as the requirement of a few years ahead, to meet the population need. Perhaps you think

that is a fantastic idea of some starry-eyed theorist. The estimates of 1940 seemed just as unrealistic then, yet they are surpassed today.

I don't like to deal in statistics, but let me emphasize a few figures in Georgia:

In 1951 you consumed 1,312,000 tons vs 834,000 tons in 1941, an increase of 57%. It is encouraging to note that the mixed fertilizer was 80% of the total in 1951 vs only 67% in 1941.

Your increase of 57% compares to the national increase of 113%. However, it probably isn't a fair comparison, since a large amount of new territory is included in the national increase.

If your increase is continued at only the same rate, the total consumption in 1955 would be 1,500,000 tons. This is perhaps still much below the agronomic standard of economic usage. There is a lot of new business to be had, without chiseling the other fellow's.

I can sum up this whole lengthy discourse into one short definition—"Creative Salesmanship"—which includes Management, Salesmen, and Distributors working as a cohesive unit under a thoughtfully planned program of merchandising.

Don't let the other fellow set our program or put the value upon our product. Stop trying to buy the other fellow's business, and get busy building new business for ourselves. I have often speculated upon how far this industry could go if everyone of the thousands of salesmen we have in the field devoted 100% of his time doing what he is paid to do, to create and develop a sale for his product, disregarding entirely what others may do. Oh! but you say, "the farmer will only buy my goods at the same price." Won't he? How do we know? Does he buy his seed that way, or his stock feed, or his insecticides? If he buys his Plant Food only on price, it's because we sold him the idea in the first place. Is it peculiar to the fertilizer business that the farmer makes no distinction of our product, not only what is in the bag, but what is **behind** the bag. Or is it that we lack the courage to

sell ourselves.

Progress in the field of development in the plant food industry has always been restricted by the fact it is a narrow profit margin business. The poorest service we can render the farmer, as producers or dealers, is to sell him the product of today at the **cheapest** per ton price. To the contrary, the best investment he could make would be in a somewhat increased price to return a margin sufficient to support the necessary research, engineering, improved educational and distribution services for the development of more efficient products of tomorrow, at lower costs per unit of contained plant food.

There is underway now a program developed by the industry associations on a national basis, and supported by some of us individually, to educate the farm bankers on the economic values of sound fertilizer programs, since he often controls the quantity, grade, and price of fertilizer which the credit farmer uses. It is definitely to his interest to require the most advanced farming practice, as security to the credit extended, just as the city banker demands in making industrial loans. Selling the country banker along the lines I have expressed in the foregoing has an important place in our promotional sales effort.

I have tried to raise the questions which I think are pertinent, not to answer them. Obviously if I knew the answers, I would have cured our own troubles, and the entire industry would be bidding wildly for my services. They are not.

In concluding, my friends, I feel sure that all of you recognize the homely illustrations I have made. A few of you may even feel that guy is really talking sense, and I'm going to pay attention to it hereafter. Let me assure you it will be the same remorse which promotes a pledge of sobriety the morning after, or makes us decide to stop beating our wives. When the pressure arises, will we revert to type and fall at times to the sins of our earlier training, or have we gained from recent years an experience, that our success is not in doing what the other fellow does,

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Mercury Compounds  
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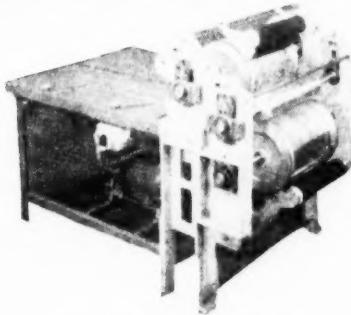
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but in what we do ourselves. If I leave with you even the germ of an idea, which will remain in the back of our minds, and serve to restrain some of the tendency to unsound practices, which will influence our thinking in the more constructive channels, and help us teach our successors better merchandising principles; then I can have the great satisfaction of feeling that I have contributed something to a really worthwhile accomplishment.

#### G.P.F.E.S.

(Continued from page 24)

rolls are the folks who eat and otherwise consume the products of the soil. There will be surplus commodity problems ahead, he believes, but that is only for a brief time. The famed "Fifth Plate" population should take care of these.

That concluded the session.

A banquet followed, presided over by Fielding Reed, and featured by

the presentation of two honorary memberships in the Society. The presentation was made by Dr. C. C. Murray, University of Georgia, to the widow of W. O. Collins, and to E. D. Alexander, both of the University, with citations reciting their major contribution to agriculture.

The group then returned to the original meeting hall, and a presentation by Bob Engle, NFA, of the NFA cup for grassland progress to J. P. Baker, a Georgia county agent.

The meeting was concluded by the rain-making talk by Dr. George D. Scarset, American Farm Research Association. Actually it was a discussion of a test farm he owns near Purdue, where he flew in the face of local convention, local customs and local bankers by pouring on 1100 pounds of 10-10-10, plus a lot of nitrogen side-dressing, and made a good crop of corn.

And to be thoroughly unconven-

tional, he left the weeds in the field, supplying, as he said, extra fertilizer to feed the weeds—which formed a cover crop that cost nothing for seed, and—he believes—are as rich in plant food as any of the conventional legumes.

Mingled with this unusual message was the Scarset humor as he went through the stages of his troubles with bankers, whose board consisted of conservative farmers. And the Scarset philosophy that if we had never broken a rule the Indians would still have this country.

"We have had an explosion of scientific stuff out of the laboratories," he said. "Now we have to harness it. Now we can take empty lands and with what we know about land management make something of them.

"We are the leaders, whether we know it or not. And if there is 3 to 5 times the money return from proper fertilizer investment, why can't we get it over to the farmers?"

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We've published a booklet on the Installation and Operation of a Nitrogen Solution System which we'd like to furnish you. Write for your copy to P. O. Box 4628—Atlanta 2, Georgia.

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## Fulton Bag To Build Plant

Plans for the expansion of the Fulton Bag & Cotton Mills' Multiwall Paper Bag Division with a new multiwall plant to be located in St. Louis were disclosed January 26 by Clarence Elsas, president, at the company's executive offices in Atlanta.

The building, which will have approximately 50,000 square feet of floor space, will be a modern single story structure. Constructed entirely of non-combustible materials, it will be equipped with sprinklers throughout and lighted with fluorescent fixtures. Blueprints include facilities for offices, manufacturing area and warehouse.

Company officials expect the new factory—the third multiwall plant established by Fulton Bag—to be in operation by July or August of this year.

"The new plant is designed to give better service to customers in the

paper bag multiwall business throughout the Middle West and will in no way affect our present textile operations in St. Louis," Mr. Elsas explained.

### State Level

(Continued from page 26)

**ALABAMA**—A meeting has been called for February 3rd in Montgomery at City Hall by J. C. Lowery, Extension Agronomist at Auburn to probe the Educational Society idea. Alabama suppliers, manufacturers, educators and others have been invited.

### S.C. Meet

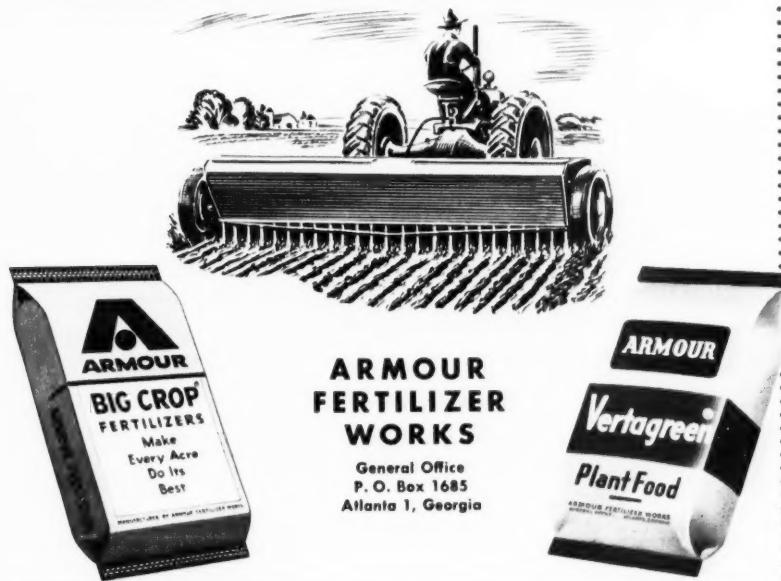
(Continued from page 21)

reported progress is being made in the use of insecticides in fertilizer. Mr. Cloaninger briefly outlined points in existing fertilizer laws. J. E. Youngblood, chairman, State Commission of Marketing, stressed the need for greater efficiency in marketing farm products.

## Colorado Holds First Fertilizer Conference

When some 100 industry representatives met at the Colorado A&M early in January, it was the first fertilizer conference ever held in that State, and perhaps the only one ever held in the Rocky Mountain area. Managed by the Colorado A&M staff, a program of area field response to fertilizer was presented, a report on a program now in progress testing methods of placement. One of the features was a discussion of fertilization of mountain meadows, where high nitrogen application is often required. The meeting concluded with a banquet, at which NFA president Russell Coleman discussed opportunities for fertilization in the State. Definite plans were made to organize for the promotion of the Land Grant College-USDA Fertilizer-Lime program.

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Cuba and San Juan, Puerto Rico

# CORROSION Prevention and CONTROL

From time to time we encounter in the country's newspapers and trade journals, estimated costs of our national bill for damage done by corrosion in our vast industrial enterprises. The figures are always large, extending into the billions. They are seldom qualified as to whether or not these estimates include items of replacements and repairs on which a reasonable and satisfactory economic life was attained, or whether they represent the sum total cost of dismantling, repairing and replacing our process and transportation equipment. Suffice it to say that in any case, the cost is of a magnitude to warrant our active attention. All of us have some working knowledge and experience in corrosion problems, such as those arising in keeping the chrome plating of our cars bright, or resulting from our efforts of keeping the window screens from staining the paint on our homes. Books have been written on both the underlying theories of corrosion and on specific problems arising in the handling of a single chemical with various materials of construction. Adequate coverage of the corrosion field, which seems to be all inclusive, would require days of discussion.

The writer has never attended a meeting during which corrosion was

An address delivered at the Plant Maintenance Conference, held concurrently with the Fourth Plant Maintenance Show, at Cleveland, Jan. 19-22, 1953.

By R. C. THIEDE  
Chief Field Engineer, General Aniline  
Works

discussed, but that someone arose to laud the satisfactory performance of metal or alloy under a given set of conditions only to be contradicted by another, who found results to be exactly the opposite. On other occasions, when suggesting that perhaps the answer to a particular problem might be found in a handbook of corrosion, he has been told, "You can't go by what they recommend. We've tried that on several occasions and never found anything that answered our problems." Paradoxically, everybody is right. Both those who have been successful and those who have failed in applications know what results were attained and what the savings realized or costs incurred were, as the case may be, and the scientists who compiled the technical data for the handbooks have faithfully tabulated results. Such is the nature of corrosion, that only under rigidly controlled conditions of temperature, velocities, corroding media, etc. can results be comparable.

A great deal of attention is given today to the development and application of the stainless steels and non-ferrous alloys. These of us who are actively engaged in maintaining plants as economically as

possible, plagued as we are with ever rising costs, are inclined to pin our high hopes on the development and economic application of these alloys. However, I call your attention to the annual steel production report as compiled and published by the United States Dept. of Commerce. In the year 1951, the nation reached an all time high output of over 105 million net tons of which 10 million tons (9.5%) went over into alloys of all kinds and of this, approximately 0.9 million tons went into stainless production. Less than 1% of our total steel output was utilized for the production of the more corrosion-resistant alloys. While every effort should be made and maintained to accumulate data and information on the use of the alloys, we should not lose sight of the fact that our present problems will remain with us for years to come and we should not tend to de-emphasize their importance.

In my position as Chief Field Engineer at the Grasselli plant of the General Aniline Works, charged with the responsibility of the Construction and Repair Section of the Engineering Department, I am daily confronted with the maintenance problems of equipment handling mineral acids, solvents, organic chemicals, refrigerated brines, recirculated cooling water, etc. It is some of these problems and our approaches to their solutions which I would like to discuss with you.



## WITHSTAND SHOCK

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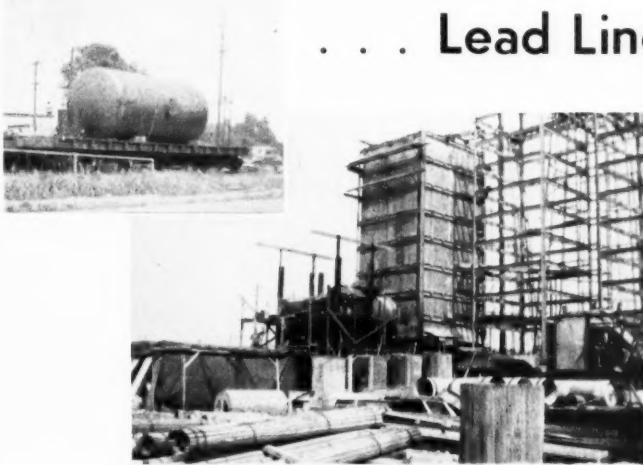
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### Corrosion Problems

**1. Pipelines & Valves**—In chemical handling plants, the capital investment in pipelines may be anywhere from 10 to 40% of the total capital and as such, the repair and maintenance of pipelines represents a large portion of maintenance costs. For the most part, the materials of construction used for handling the mineral acids has been well established by industrial experience. As for example, steel is commonly used for handling sulfuric acid at 78% and higher. However, we have encountered severe corrosion problems in pipelines and valves even when handling acid at these concentrations.

Our first difficulties were encountered in all steel gate valves, which failed because of pitting on the gate and seat surfaces. We approached the problem by installing valves of cast steel body and stainless steel gates and seats. At first evaluation, results looked promising, but eventually it was found that because of the difference of potential between the stainless steel seat

rings and the steel body, corrosion of the steel at the point of contact was accelerated and the uncorroded stainless steel rings often ended up in the pipelines.

For concentrations of sulfuric acid below the strength of oleums, we now successfully use all alloy valves of FA-20 type, or its equivalent.

The initial cost of the stainless steel valves is approximately twice that of the stainless steel trimmed steel units, but the life is eight to ten times as long and then repairs made by renewal of gate and resurfacing of seats usually restores the valve to service.

On one particular process we were handling an organic solution containing concentrations of approximately 5% phosphorous chlorides. The line and valving were lead and while the line was trouble-free, the best service life of the lead valves was three months. An all alloy valve was installed and except for a bonnet gasket renewal, remained in service for 2½ years.

One of our engineers in charge of maintenance in one area of the plant

experienced corrosion problems in steel pipelines handling 100% sulfuric acid. The life of the steel line was approximately two years. The line was used to fill small acid measuring tanks from an overhead storage, and when not in service was shut off and allowed to drain. Moisture entering with the air diluted the residual acid in the line, and when failure occurred it was observed that a very distinct grooving by corrosion at the bottom of the line ultimately resulted in a complete failure. The line was renewed in a stainless steel, and for six years has been entirely trouble free. At the time of renewal, the engineer estimated that a life of four years would be required to justify the increased cost of the stainless steel.

**2. Lead Equipment**—Lead and leadlined equipment is an old standby material of construction in the chemical industry. Yet, despite long years of experience in its use, it still presents its problems.

In homogeneously leadlined equipment we have been confronted with the problems of the lead cracking in

a manner suggestive of intercrystalline embrittlement. Other investigators, Berkenale and Waterhouse, who investigated the deterioration of lead cable sheathing, concluded that stress, particularly vibration stress, was a factor promoting such failure.

Somewhat later, investigations of Hargh and Jones, on "Atmospheric Action in Relation to Fatigue in Lead," seemed to show conclusively that penetration of oxygen is the necessary corrosion environment favoring fracture.\* Experimentally it was demonstrated that under like conditions of stress, simple atmospheric exposure was two to four times more likely to produce failure than that occurring under non-oxygen exposure.

Our own observations have been that the tendency toward cracking is more pronounced in the upper sections of homogeneously lead lined agitator shafts, where stresses are greatest and which are normally exposed to oxygen. Agitator shafts

having loose linings are not subject to cracking and our practice is to loose line these troublesome areas. We have also observed that the wall areas usually affected are predominantly at or above the liquid line. This would seem to bear out the conclusions of the above-named investigators, but our own investigations are not sufficiently advanced to permit conclusions at this time.

Alloying lead with 6-8% antimony or with .05% tellurium hardens lead and increases its mechanical strength. In the fabrication of lines, and particularly of heating coils, hard lead is advantageous, and sagging tendencies between support points are much less than that experienced with the soft chemical lead.

Claims are made by some that alloying decreases corrosion resistance. We have not found such to be the case, and have attained good service life on tellurium lead coils.

However, the problem of supporting the coils within the equipment has been troublesome and required attention. Our original installations

were of homogeneously leadlined steel supports. When failure of the lead-lined occurred, attack on the supporting steel was severe and often had progressed to the point where extensive rebuildings were required when failures were detected.

Our present solution to this problem is to use supports cast entirely of lead.

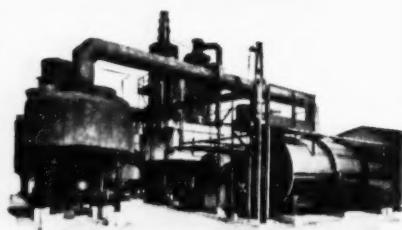
Within the past year, we have installed coils constructed of leadlined copper, but have no experience as to the problems they will present when repairs are required.

We would have found that lead lines supported on angle or channel iron require less maintenance than lines armoured with steel. Under the latter type construction, there was a tendency of the lead to crack at the flanges. We avoid flanges in leadlines as much as possible, preferring to burn all joints.

**3. Painting**—Thomas' Register of Manufacturers lists a thousand or more manufacturers of protective coatings or paints. Undoubtedly, all of them make good paints, but

\*McKay & Worthington, "Corrosion Resistance of Metals & Alloys."

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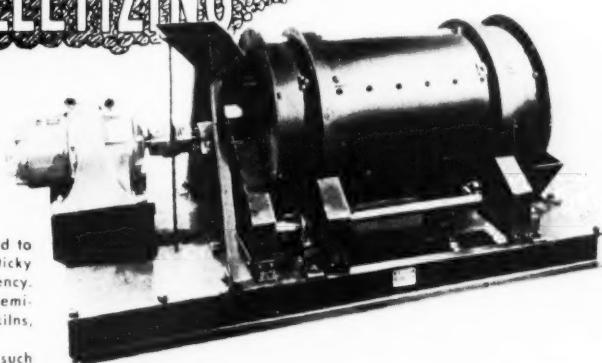
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whether or not such paints are suitable under particular conditions of exposure must be determined by special investigations in each case.

At Grasselli atmospheric conditions are of the worst order. Located in the marshlands close to the sea, the relative humidity of the air is generally high and this, in itself, would make the maintenance of a protective surface coating a problem. The situation is aggravated by chemical fumes so that the proper maintenance of steel surfaces, both within the buildings and outside, is in itself a problem of considerable size.

Our investigations to date have disclosed that no single paint will answer every purpose and that for general painting purposes under our conditions, a paint blended of oil and phenolic vehicles gives longer service life than that attained by the straight applications of either the oil or phenolic types.

Under outdoor conditions, the service life of the blended paint is approximately 2½ years. The key

to reducing painting maintenance costs is adequate and careful surface preparation, and then repainting before a complete breakdown of the original application occurs. Our checks on cost have shown that a surface requiring extensive scaling and cleaning is three times as costly to prepare and prime as it is to apply the finish coat. We are currently investigating surface preparations by the use of phosphortizing chemical coatings prior to paint applications, such as that used by the automotive and household refrigerator manufacturers, but have not progressed to the point where such practice has proven worthwhile.

In some plant areas tar base paints have proven successful, but they have a tendency to remain tacky, sag under summer sun conditions and do not readily lend themselves to code color scheme requirements. Heavy bituminous type coatings have not proven successful. Several applications failed because of rusting of the steel beneath the coating and while the outer surfaces appear

sound after a few months, the coating dropped off in sheets. Excepting in those instances where baking, or heat curing, is possible, the straight phenolic and vinyl base paints are too hard and inflexible and usually fail in the nature of cracking and peeling.

A recent survey on industrial painting problems conducted by "Chemical Engineering" was most interesting in its revelations. This survey disclosed that 72% of all industrial painting was still brush applied; that the average service life of paint under severe conditions was approximately one year; and that an industrial plant of 2,000 employees consumed annually 2.2 gallons of paint per employee. Here, indeed, is a costly and frequently repeated maintenance operation which, I fear, has been too long accepted as a necessary measure but without having been given its due share of attention.

We are currently testing the advantages of applying paint on large surfaces, such as storage tanks, by

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roller application. All seams and other hard to reach surfaces are brush painted and then the main surfaces roller painted. Our tests to date, while still too recent to permit evaluation of painting life, have, however, indicated that a 75% manhour saving is possible in this type application.

**4. Cleaning Equipment** — Not enough attention is given to cleaning equipment, particularly such items as transportation and warehousing mobile units, heat exchangers, boilers, jacketed units, etc.

Production people seem to believe that only a breakdown warrants time out and maintenance people are satisfied to let well enough alone. The net result is that corrosion products, scale, silt in cooling water, etc. are permitted to accumulate to the point where cleaning becomes a major dismantling operation.

A case in point concerned a heat exchanger in which a solvent was recovered, and in which the cooling

was done by recirculated water in a cooling tower system. The unit had been removed for retubing and upon resumption of operations in the process, it was possible to distill a standard batch within an 8 hour period. After approximately six months of operation, the cycle had increased to 14 hours, but nobody did anything about it, until finally a complete blockage occurred. The unit was then dismantled by removing both heads and each of the 100 odd tubes cleaned individually. After this cleaning operation the distillation cycle again dropped to the initial 8 hours.

Our standard practice on such important key pieces of equipment now is to clean them periodically on a preventive maintenance basis by circulating inhibited acids. This operation usually is done under careful supervision and normally requires approximately 4 hours' time out of service.

Since this practice was initiated we have had fewer tube failures

and a much increased exchange efficiency.

Tests conducted in this and other cooling towers by exposing test panels, some of which had the main plane surface parallel to the flow and others with the plane at right angles to the flow. In the latter case the suspended solids circulating within the system accumulated on the upper surfaces and gave erratic corrosion test results, but averaging 4 times greater than results experienced on the other panels.

A similar fouling problem occurred in our main cooling water system, which circulates sea water on a once through basis. Here, in addition to silt and scale, we were plagued with biological fouling, and resorted to the standard and widely-used practice of chlorination. At the time we happened to be conducting comparative corrosion tests on all our circulating systems and had accumulated data on sea water corrosion rates. With chlorination we

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experienced a 350 fold increase in corrosion rates and pipelines in various areas began to leak.

We discontinued chlorination and immediately corrosion rates dropped back to normal. Chlorination was again resumed and up bounced the corrosion rates. At this point the decision was made to abandon the chlorination project.

Time permitting, we may be able to discuss this particular case during the question and answer period.

**Corrosion Field Tests** — The last approach to a corrosion problem is by testing in the field under actual operating conditions. This requires time and effort, but it will pay off in the long run.

By referring to publications, it is often possible to determine what direction should be taken; that is, whether or not an alloy or metal has possible use in the application and when this has been established and the field narrowed down, testing of various samples should be made to establish the best selection.

It must also be determined at this

initial stage that the material under consideration will be fully suitable for fabrication and is not specifically limited to castings, which may prove too costly to obtain even though they give best corrosion resistance. Many materials have specific problems of machining and welding and all such problems should be investigated prior to testing.

Our field tests always include panels which have been welded in order to establish whether or not this phase of fabrication will prove troublesome.

The testing should be under the guidance of qualified technical personnel and not left to the discretion of foremen or mechanics. We were quite recently alarmed by the fact that the areas around the bolt holes in the bonnets and bodies of cast iron underground valves was severely attacked and apt to fail under line pressure. Investigation disclosed that field mechanics had experienced trouble in removing steel bolts during the course of a repair

and had reinstalled bolts of monel to assure ease of repair at a future date. The ground conditions were such that electrolytic corrosion was proceeding at an alarming rate and required immediate attention. We have likewise observed that all major progress made in corrosion control has been the result of the efforts of technically trained personnel, and not from those performing the work, who are primarily concerned with getting equipment back into service.

**Conclusions** — In dealing with problems of corrosion, it should always be kept in mind that alloys were developed for specific conditions and are not to be regarded as care-alls and that under any condition, adequate tests should be made prior to large investments involving such alloys.

It should be emphasized that materials of construction, castings and methods of application, which have long been accepted as a so-called standard, should not be ignored in our investigations to obtain improvements on the basis that some-

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day somebody will come along with something better. Even when that day arrives, we will still require long years of experience to establish fully the usefulness and limitations of those developments.

It is regrettable that industry as a whole is too much inclined to be content with making grants to universities and colleges to carry on these investigations and not in general actively pursuing corrosion control work. It is also unfortunate that most of us are content with solving our immediate problems and not taking time out to publish and discuss our findings, excepting as on such occasions as this.

## MARKETS

**Organics:** The fertilizer organic market continues rather quiet but domestic producers of Nitrogenous Tankage are in a heavily sold position at prices ranging from \$4.55 to \$5.00 per unit of Ammonia, bulk, f.o.b. shipping point. Limited quantities of domestic Nitrogenous are available. Imported Nitrogenous, in bags, CIF Atlantic ports is offered in light quantity at around \$6.00 per unit of Ammonia.

**Castor Pomace:** Domestic market continues at \$37.25 per ton in bur-

lap bags, paper bags, seller's option f.o.b. Northeastern production point with \$2.00 per ton allowance for shipment in paper bags. Imported material varies in price from \$36.50 to \$45.00 per ton CIF Atlantic ports, depending on the quality.

**Dried Blood:** Current Chicago market is approximately \$6.50 per unit of Ammonia bulk for unground Blood with the New York market at approximately the same level.

**Potash:** Movement from domestic sources is reported averaging better than this time last season, although here and there requests for delayed shipment are noted. 60% grade Muriate is currently 43c per unit K20, bulk, f.o.b. Carlsbad. Imported material is offered at the ports at prices equivalent to the delivered cost of domestic material. In some cases, imported material is offered at a few cents per unit less.

**Ground Cotton Bur Ash:** This excellent source of Potash, primarily in the form of Carbonate of Potash, is available for prompt and future shipment at prices approximately the delivered cost of Domestic Sulphate of Potash. Current production tests 38% to 42% K20.

**Phosphate Rock:** Supply conditions remain relatively unchanged and the market firm at recent levels.

**Superphosphate:** Stocks on

hand at production points appear to be very comfortable but will be reduced as the new season continues. Prices remain firm and at ceiling levels. Triple Superphosphate is in strong demand and supply somewhat short relatively.

**Sulphate of Ammonia:** The market continues relatively tight on Domestic production at prices ranging from \$44.00 Pittsburgh district to \$49.50 Birmingham district in bulk. Imported material at various ports is offered at around \$50.00, bulk, f.o.b. cars.

**Ammonium Nitrate:** Prices remain unchanged at \$64.00 \$64.30, in bags, for domestic material and \$72.50 per ton for Canadian material. Demand is far in excess of supply.

**Nitrate of Soda:** Imported stocks are comfortable and Domestic production currently adequate. No change in prices has been noted.

**Calcium Ammonium Nitrate:** This form of Ammonium Nitrate testing 20 1-2% Nitrogen is currently available at \$51.25 per ton in 100 lb. paper bags f.o.b. cars for arrival at several Atlantic and Gulf ports. Vessels to arrive during January at Savannah and New Orleans.

**General:** Superphosphate production continues at a good rate and supplies of this ingredient as well as Potash and several forms of Hard Nitrogen are comfortable for the present.



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# YIELD OF LEGUME SEED INCREASED BY USING BORAX

By LOUIS N. WISE<sup>1</sup>

Application of as little as 5 to 10 pounds of borax per acre increased the yield of crimson clover seed by 142 percent at the Coastal Plain Branch Experiment Station at Newton, in 1951-52 tests. A similar test at the Brown Loam Station at Oakley, showed a 12 percent increase in seed production as a result of borax fertilization. These beneficial effects were obtained on seed yields despite a total absence of visual boron deficiency symptoms. Borax applications had no influence on forage yields.

In addition to the effect of boron on the total quantity of seed produced, the quality of the seed as measured by the yield of large seed was greatly improved.

The application of 5 to 10 pounds of borax per acre was generally as effective as 20 pounds per acre, emphasizing the extremely small amount of this fertilizer element required for optimum yields.

In a previous test (1951) at the Brown Loam Branch Experiment Station, the yield of red clover seed was increased by the application of borax. The yields of white clover seed were similarly affected in an exploratory test at four branch experiment stations in 1950.

On the basis of the several tests in "Mississippi Farm Research"

conducted by the Mississippi Experiment Station, boron fertilization is recommended for the production of crimson clover, white clover, red

Table 1.  
Effect of boron on crimson clover seed production at two Mississippi Branch Experiment Stations (1952).

Borax applied per acre	Yield of Crimson clover seed per acre	
	Newton	Oakley
lbs.	lbs.	lbs.
0	81	167
5	197	188
10	197	196
20	196	181

phosphorus, potash and lime are response to boron fertilization. necessary to obtain optimum re-

Table 2.  
Effect of boron on the quality of crimson clover seed, as measured by size of seed, at two locations. (1952)

Borax applied per acre	Yield of large crimson clover seed acre <sup>2</sup>	
	Newton	Oakley
lbs.	lbs.	lbs.
0	34	82
5	72	91
10	66	95
20	68	89

<sup>2</sup> Total seed yields were separated by screening into a large and small seed category.

The cost of 5 to 15 pounds borax is negligible, amounting to only \$.50 to \$.75 per acre. The return on this investment is often many times this amount.

## Winter Grazing Tour Cancelled

The usual Winter Grazing tour, held in the Southeast annually has been cancelled, due to the dry fall and late seeding. Winter grazing is expected to be scarce, according to Borden Chronister.

## 100 People Or Less Is "Small Business"

The Small Defense Plants Administration has decided that the old figure of 500 was too high, and has now ruled that plants with 100 people or fewer are small business. This is part of a set of new standards which are to be sent to all trade associations, together with a new definition.

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